DRAFT

Environmental Impact Statement

Bison Conservation and Management in Montana

June 2015

Montana Fish, Wildlife & Parks

List of Tables and Figures

Executive Summary

The purpose of this Environmental Impact Statement (EIS) is to determine if bison restoration is appropriate and if so, what potential opportunities are feasible and consistent within Montana's laws, policies, rules, and regulations. It is Montana Fish, Wildlife and Parks' (FWP) desire to fulfill its statutory obligations to manage all wild ungulates in the state, while recognizing that bison management presents additional challenges compared to other species.

Bison are designated as both a wildlife species in need of management and a species in need of disease control in Montana. The only bison currently considered wildlife in Montana are those bison that come from Yellowstone National Park. Management of these bison is coordinated by signatories to the Interagency Bison Management Plan.

FWP is required to manage wildlife, fish, game, and nongame animals in a manner that prevents the need for listing under the state list of endangered species (§ 87-5-10 MCA) or under the federal Endangered Species Act (16 U.S.C 1531, et seq.), and in a manner that assists in the maintenance or recovery of those species (§ 87-1-201 MCA). Within this context, FWP is using this EIS to evaluate potential opportunities for bison restoration.

The objectives of this EIS are to:

- Evaluate which method(s) for a pilot bison restoration effort may be appropriate, if any.
- Evaluate potential landownership scenarios where a restoration effort may be feasible.
- Evaluate potential costs and benefits of a restoration program.

The following alternatives are evaluated within this EIS:

- Alternative #1: No Action
- Alternative #2: Restoration of a Publicly Managed Bison Herd on the Private and/or Public Lands of Willing Landowner(s)
- Alternative #3: Restoration of a Publicly Managed Bison Herd on Tribal Lands
- Alternative #4: Restoration of a Publicly Managed Bison Herd on a Large Landscape Where there are Minimal Conflicts with Livestock

At least one "case study" has been included for each of alternatives #2-#4 to illustrate a real life scenario that fits the general criteria of the alternative. The case studies do not represent the only scenarios that fit within the criteria of the alternative but do represent scenarios to assist in evaluating feasibility of each alternative.

Within any of the alternatives to restore bison is an opportunity to carry out a five-year test project. Any test project or any restoration project would follow implementation guidelines described within this EIS to include: 1) project site guidelines; 2) bison source herd guidelines; 3) herd management guidelines; and 4) program implementation guidelines. In particular any test or restoration project would: 1) only use animals free of reportable

diseases and free of cattle gene introgression; 2) involve a pre-restoration range assessment; 3) have a well thought out containment and management plan; 4) have secure full funding for at least a five-year test period; and 5) have local community involvement.

Potential impacts to the human and physical environment are evaluated for the alternatives, however, the evaluation is based on broad restoration scenarios. In general, bison restoration somewhere in Montana could be beneficial to recovery of the species as a whole and contribute to the restoration of ecological processes within the restoration site. Bison restoration could provide new opportunities for hunters and recreationists but could complicate some land management. Agricultural interests could be negatively impacted by bison in areas near private land but the magnitude of those impacts is difficult to determine without a specific restoration site. FWP resources would be impacted in order to increase capacity to manage a greater number of bison as wildlife than currently present.

The final Record of Decision for this EIS will not identify a site within Montana where bison restoration will occur. Rather, the decision will identify potential opportunities and guidelines for restoration if it is determined to move forward with some effort. A site-specific Environmental Assessment will be needed in order to fully evaluate all factors and potential impacts of any effort to restore bison if a record of decision selects any of the restoration alternatives. Selection of the 'no action' alternative will not preclude efforts to restore bison at some later date.

Acknowledgements

Members of the 'Bison Discussion Group' formed in 2013 deserve special recognition for their assistance in the framing of this document. The following members participated in one or more of the three group meetings; Mark Albers, Keith Aune, Jay Bodner , Senator Taylor Brown, Ervin Carlson, Chelcie Cremer, Matt Derosier, Dick Dolan, Tom France, Andrea Jones, County Commissioner Chris King, Representative Mike Lang, Christian Mackay, Jeanne-Marie Souvigney, Dave McClure, Ron Moody, Vicki Olson, Senator Jim Peterson, Senator Mike Philips, Rick Potts, Tom Puchlerz, County Commissioner Lesley Robinson, Dean Rogge, FW Commissioner Richard Stuker, and FW Commissioner Wetsit. Discussions were facilitated by Virginia Tribe.

Individuals particularly helpful with the 'Case Study' write ups include: Keith Aune, Bill Bates, Ervin Carlson, Sean Gerrity, Mike Hammett, Jeremy Kidd, Kyran Kunkel, Daniel Lirette, Dax Mangus, Clint Sampson, Paul Santavy, Alicia Woods, and Rob Woods.

FWP staff that assisted in preparation of this document include: Rebecca Cooper, Arnold Dood, Tom Flowers, Director Jeff Hagener, Lauri Hanauska-Brown, Quentin Kujala, Ken McDonald, Adam Messer, Margaret Morelli, Mark Sullivan, Sam Sheppard, Tom Palmer, and Mike Volesky. Stephanie Adams, Arnold Dood, and Lauri Hanauska-Brown prepared the document, *Background Information on Issues of Concern for Montana: Plains Bison Ecology, Management, and Conservation* that was used to inform much of Chapter 2 within this EIS.

The public scoping process including the eight 2012 meetings held across the state benefitted greatly from the involvement of Tom Palmer, Stephanie Adams, Arnie Dood and FWP regional staff too numerous to list.

Chapter 1: Project Overview and Summary

1.1 Introduction

The restoration and preservation of wildlife and natural resources has caused many to regard Montana as "the last best place". Many of Montana's prized fish and game species, including deer and elk, were almost lost during the unregulated commercial hunting and fishing of the 1800s and early 1900s. If it were not for the recognition of the need to preserve these species by early Montanans, many would have disappeared from the land. Montana has been successful in restoring many of the wildlife species that were present when Lewis and Clark first crossed the region on their way to the Pacific.

Bison flourished throughout the majority of Montana prior to the settlement of the American West and were a keystone species of the Great Plains ecosystem. In the summer of 1806, Meriwether Lewis recorded passing immense herds of buffalo in the Marias River area (Brandt, 2002). Following decades of substantial loss, bison were saved from complete extinction by a diverse group of individuals but are now restricted to particular geographic areas or kept behind fences.

Bison restoration presents opportunities for restoring some of the ecological role bison played on the prairie, as well as for increasing tourism and hunting opportunities. Yet, there are concerns that bison could negatively impact agricultural interests, affect current land uses, transmit diseases to livestock, have negative economic impacts, or reduce public access.

Montana, Fish, Wildlife and Parks (FWP) has started an open and inclusive public process to thoroughly examine potential conflicts, concerns, and opportunities in order to explore whether there is a place for bison restoration on the Montana landscape at this time. Beyond this effort, there are additional bison-related programs such as the ongoing management of bison migrating outside of Yellowstone National Park (YNP) during the winter. FWP is one of seven cooperating agencies involved in the management activities of YNP bison.

It is important to understand the history of bison in Montana in order to explore opportunities for restoring somewhere bison outside of YNP. Prior to the European settlement of the West, Native Americans and bison coexisted for thousands of years. Bison were the primary source of sustenance for many of the plains tribes. Large herds of bison resided in and moved throughout virtually all areas of Montana east of the Rocky Mountains, with evidence of smaller bison groups utilizing western Montana. In 1882, a herd that was estimated to have contained between 50,000 and 80,000 bison was observed crossing the Yellowstone River near Miles City.

Early European explorers and settlers quickly recognized the value of bison. Many recognize that the bison helped to secure the European settlement of the West providing sustenance, fuel, and materials for settlers and was the sole reason many were able to survive. The recognition of the extensive value of the bison soon brought hunters from

across the United States to the Great Plains in search of profit. Even during the early days of bison hunting, many foretold of the impending destruction of the species.

It was not only the bison hunters, but also settlers that mercilessly hunted the species to near extinction. By the mid-1850s, buffalo robes were increasing in popularity in the eastern markets, creating a high demand and causing a large number of hunters to descend on the plains of eastern Montana. With the lack of protection at both the territory and national level the great herds were all but gone by the 1880s. The disappearance of the bison had a tremendous impact on the culture and economy of the plains tribes.

Some early Montanans, including pioneer Montana rancher, miner, and statesman Granville Stuart, tried to enact territorial legislative protection for bison without success (Phillips, 1997). In 1872, the Montana territorial legislature passed an act, championed by Stuart, that established a closed season for buffalo, moose, elk, deer, mountain sheep, Rocky Mountain goats, antelope and hare, between the 1st of February to the 15th of August (Brownell, 1987). Though the intention of the 1872 Act was clear, its passage did little to guarantee enforcement. A bill sponsored by a Helena-area rancher, Edward G. Brooke, was passed in 1879, protecting bison for a ten-year period in Lewis and Clark, Jefferson, Deer Lodge, and Madison Counties. The lack of governmental enforcement prompted citizen groups such as rod and gun clubs to focus on the protection of wildlife.

It was indeed sportsmen who first led the call to preserve the bison and inspired others to do the same. Six men in particular have been credited with establishing the private herds, mainly with orphan bison calves captured within Montana, from which the majority of present-day bison have since descended. Montana was home to the famed Pablo-Allard Herd that was used to restock and supplement many of the public conservation herds in existence today, including those at YNP and the National Bison Range (NBR).

The number of Plains Bison slowly increased until the 1930s with most of the increase in public conservation herds. The population of bison in these *public* herds has remained relatively stable since that time. Since the late 1960s, the number of Plains Bison in *private* commercial herds has greatly increased to over 150,000 animals in 2010.

Wild bison have been absent from the landscape for so long that many have forgotten the value that the species could provide to hunters, tribal members, the ecosystem, and Montana's wildlife legacy. The current decision over whether or not to take action to preserve bison, as a wildlife species, is not one that is unique. It is one that individuals, groups, and governments have struggled with since the European settlement of the West. The opportunity now exists for Montana to explore what would be best for Montana recognizing the diversity of values and opinions held by its citizens. While the days of untold millions of bison moving across the prairie will not return, the citizens of Montana have the opportunity to engage each other in thoughtful discussion.

1.2 Purpose and Need for the Proposed Action

The purpose of this Environmental Impact Statement (EIS) is to determine if bison restoration is appropriate and if so, what potential opportunities are feasible and consistent with Montana's laws, policies, rules, and regulations. It is FWP's desire to fulfill its statutory obligations to manage all wild ungulates in the state, while recognizing that bison management presents additional challenges compared to other species.

In Montana, Plains Bison are designated as both a wildlife species in need of management and a species in need of disease control. They are further classified as a Species of Concern because they are considered to be 'at risk' due to historic extirpation, limited populations, loss of genetic diversity, threats to their habitat, and/or restricted distribution. Presently, the management of bison in Montana is exclusively guided by the Interagency Bison Management Plan (IBMP) for YNP bison within restricted areas north and west of the park. Beyond the seasonal presence of YNP bison in Montana, only one other conservation herd is found in Montana at the National Bison Range (NBR) near Moise. The NBR currently supports 300-400 bison on 18,560 fenced acres. As of 2008, it was estimated that there are currently 20,504 Plains Bison in 62 conservation herds within the United States and Canada. Of the 62 conservation herds, 87% are believed to be located within the original range of Plains Bison.

By law, FWP needs to "enforce all the laws of the state regarding the protection, preservation, management, and propagation of fish, game, fur-bearing animals, and game and nongame birds within the state" (§ 87-1-201 MCA). Furthermore, FWP is required to manage wildlife, fish, game, and nongame animals in a manner that prevents the need for listing under the state list of endangered species (§ 87-5-10 MCA) or under the federal Endangered Species Act (16 U.S.C 1531, et seq.), and in a manner that assists in the maintenance or recovery of those species (§ 87-1-201 MCA). Within this context, FWP implements positive conservation and management strategies that fulfill these directives to preserve and restore wildlife species in Montana.

FWP recognizes that the long-term future of bison in Montana depends on carefully balancing the complex biological, social, economic, and political aspects of bison management. FWP considers this wide spectrum of interests while attempting to design and implement flexible programs that are responsive, adaptive, and address the concerns of people affected directly or indirectly by all wildlife.

Objectives of this EIS:

- Evaluate which method(s) for a pilot bison restoration effort may be appropriate, if any.
- Evaluate potential landownership scenarios where a restoration effort may be feasible.
- Evaluate potential costs and benefits of a restoration program.

1.3 Benefits of the Proposed Action

Managing bison as a native species according to a publicly developed planning document would allow bison management and possibly restoration within Montana to move forward in a more open and transparent manner. Completion of this EIS allows FWP to explore a variety of opportunities for bison restoration that may be biologically, socially, politically, and economically feasible.

1.4 Decisions to be Made

The process of preparing an EIS under the Montana Environmental Policy Act (MEPA) requires FWP to evaluate the options for restoration and the feasibility of implementing any of these, as well as an option to maintain the status quo for the management of the species. Any decision to implement a restoration alternative would be followed by preparation of a site-specific Environmental Analysis (EA) including the preparation of a site-specific management plan as required by Montana statute 87-1-216. A decision to not implement any option for restoration would result in no further action by FWP. Selection of this alternative would not prevent other entities from further discussion or action within state law or mandates.

1.5 Other Agencies that have Jurisdiction or Responsibility

FWP proposes the alternatives within this EIS under its responsibility as trustee for the wildlife of the state. The courts of Montana have determined that bison are wildlife and should be managed as such by FWP (Citizens for Balanced Use, et al. v. Maurier, FWP, et al., 17th Judicial District Court, MT (April 3, 2014). Montana statute section §87-1-201, Montana Code Annotated (MCA), authorizes the Montana Fish and Wildlife Commission to set the policies for the protection, preservation, and propagation of the wildlife, fish, game, furbearers, waterfowl, nongame species, and endangered species of the state (§87-1-201 MCA). Within the policies established by the Commission, FWP is responsible for supervising the management and public use of all the wildlife, fish, game, furbearing animals, and game and nongame birds of the state.

Because bison are designated as a species in need of disease control (§87-1-216 MCA) due to their potential to spread a contagious disease and cause damage to persons or property, FWP is obligated to consult and coordinate with the Montana Department of Livestock (MDOL) on the management of the species (§87-1-716 MCA).

Federal agencies such as the U.S. Forest Service (USFS), Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS) administer federally owned lands. These agencies manage lands according to their enabling legislation, agency missions, and relevant federal laws, rules and regulations. FWP coordinates with federal agencies on wildlife and habitat issues of mutual interest, but has no legal jurisdiction over how federal lands are managed. Both the USFWS and state agencies have authorities and responsibilities for wildlife management on national wildlife refuges.

Montana's Native American tribes have jurisdictional authority for wildlife conservation and management programs within reservation boundaries. FWP coordinates with tribal authorities on issues of mutual interest.

Given multiple jurisdictions, bison restoration brings exceptionally complex challenges and the need for partner agreements. Bison restoration cannot happen on any lands without approval and cooperation from landowners, and must also be coordinated with the MDOL and state veterinarian to ensure disease concerns are addressed.

1.6 Public Involvement Process

In 2010, FWP began a process to evaluate the opportunity for establishing a Plains Bison population somewhere within the state through the development of a programmatic EIS. The MEPA process requires an agency to conduct thorough, unbiased, and scientifically based analysis of all relevant facts concerning potential impacts to the human environment. The human environment is defined by pertinent biological, physical, social, economic, cultural, and aesthetic factors (Mundinger and Everts, 1998). The MEPA process encourages the public's participation throughout the scoping process and by soliciting public comments on the draft EIS.

In 2011, a background document, *Background Information on Issues of Concern for Montana: Plains Bison Ecology, Management, and Conservation*, was prepared by FWP staff in preparation for initiation of this EIS. The document describes the current body of knowledge pertaining to bison with an emphasis on Montana. The purpose of the document was not to make management recommendations or decisions, but rather to create a foundation for an informed public dialogue about the potential future of bison in the state of Montana. A number of public meetings were held during development of the background document to allow citizens to raise potential issues and to inform them about the evaluation. Public comment was accepted throughout development and following release of the draft document.

A formal public scoping process was initiated in the spring of 2012 to identify potential issues, concerns, opportunities, and stakeholders. Eight public scoping meetings were held throughout Montana. FWP received a total of 22,928 comments from approximately 20,160 individuals that expressed a diversity of views and opinions. FWP collected 3,472 of those comments from individuals and organizations during the public meetings. The remaining comments were submitted online or through the mail from individuals, agencies, and organizations. FWP reviewed every individual comment that was submitted and developed a summary of those comments. The summary of these comments is presented in *the Issues Identified through Public Involvement* section that follows and within the summary of the 2012 public scoping process (Appendix A).

During the public scoping process a number of potential locations for bison restoration were discussed including the Rocky Mountain Front, Thompson Falls/River, Charles M. Russell National Wildlife Refuge, Elkhorn Mountains, Bitter Creek, Pryor Mountains, region around YNP, Powder River, and Terry Badlands. FWP researched each site and in some

cases, met with local organizations, individuals, and agency personnel to develop an understanding of the habitat, potential issues, and potential suitability of each location.

In addition to the public scoping meetings in 2012, FWP convened a working group of representative interests in Lewistown in September 2013 to discuss the most effective way to move forward with the EIS process. The objectives of this discussion group meeting were; 1) to provide an opportunity to better inform and clarify interests and concerns about bison on the landscape, and 2) to explore common values, parameters and guiding principles related to bison. The working group developed the following parameters to help guide any alternative considered by FWP to reintroduce bison as part of a test project or restoration effort:

- Comply with all applicable laws.
- Manage bison as wildlife.
- Respect private property rights.
- Involve landowners, sportsmen, conservationists, tribes, and all interested parties.
- Include meaningful involvement and guidance from a local working group for site specific planning.
- Have a defined timeline, desired outcomes, benchmarks, and planning for both successes and failures.
- Include monitoring and evaluation to inform management decisions and track progress toward meeting objectives.
- Include a clear process for adaptive management and identification of next steps.
- Have defined geographic boundaries.
- Have defined containment measures that may include but be not limited to fencing, geography, herding, and hunting.
- Have defined population objectives.
- Be compatible with range carrying capacity as determined by public land managers and generally accepted range science.
- Include only bison tested and confirmed free or reportable diseases.
- Include herd health monitoring designed cooperatively by MDOL and FWP.
- Include only source bison that are genetically intact/desirable.
- Utilize public hunting as a primary tool for population management and dispersal.
- Include contingency planning for unexpected circumstances, changing conditions, natural disasters, etc.
- Consider incentives for participating landowners.
- Address damages through existing game damage programs and processes.
- Identify sustainable funding for all components.
- Include annual reporting and cost assessments.
- Ensure that bison would not unreasonably affect existing land uses, such as timber harvest, energy development, or public land grazing unless mutually agreed upon by affected parties.
- Ensure that bison would not unreasonably displace other native ungulates, or reduce hunting opportunities for other species on public lands.

The discussion group met a second time in July 2014 in Billings to discuss alternatives for consideration within the statewide EIS and again in October 2014 to continue discussion of these alternatives. Summaries from each meeting are available on the FWP website.

1.7 Issues Identified through Public Involvement and Evaluated in this Draft EIS

Comments collected from the public scoping process were used to further identify issues and to develop thoroughly vetted alternatives. FWP reviewed individual comments that were submitted during the 2012-2014 scoping period. A number of comments were related to how the National Park Service (NPS) manages the bison herd in YNP, the Interagency Bison Management Plan (IBMP), or the quarantine feasibility study (QFS). While these comments were reviewed, they are beyond the scope of this EIS and more appropriately directed toward those other processes or programs.

The following is a general summary of the primary issues and concerns identified from the comments, questions, and suggestions received during the public scoping period. *The opinions, concerns, and statement below are not necessarily factual nor do they represent commitments by FWP.*

- **General Management Issues and Concerns:**
    - Managing bison movement and distribution across the landscape could be difficult.
    - Bison movement and distribution could be managed through hunting or other means.
    - Population control/management could be difficult.
    - Population control/management could be addressed similar to other game species.
    - Bison management could be impacted by changing conditions, e.g., drought, fire, or snow.

- **Fencing and Confinement Issues and Concerns:**
    - Bison could impact existing fences.
    - Bison should be managed as a wild herd and a fenced herd is not a wild herd.
    - Fair chase hunting would not be possible with a confined herd.
    - A non-fenced herd could require more complex management.
    - The containment and management of a fenced herd could be expensive and resource intensive.
    - Bison should be managed as a fenced in population.
    - Fencing to contain bison could impact the movement of other wildlife.

- **Public Safety Issues and Concerns:**
    - Bison presence could threaten the safety of children, hunters, ranchers, and recreationalists.

- Bison could pose similar risks to humans as other animals such as elk, moose, or cattle.
- Bison presence could result in increased wildlife-vehicle collisions.

- **Private Property Rights and Property Damage Issues and Concerns:**
  - Bison could damage cropland and infrastructure.
  - Bison could compete with domestic livestock for forage.
  - Landowners should be able to remove problem bison if agency response is not swift.
  - There is no existing compensation program for private property damage by bison.
  - There is no existing incentive or compensation program for landowners who allow bison on their private lands.
  - Bison could be used to limit rights on private property.
  - The right to have bison should be a private property right.
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- **Disease and Herd Health Issues and Concerns:**
  - Any bison used for restoration should be tested prior to release and monitored over time.
  - Bison could spread disease to livestock or other wildlife.
  - Livestock could spread disease to bison.
  - There is no existing contingency plan in place for a bison herd that becomes infected.

- **Hunting Issues and Concerns:**
  - A reintroduced herd should be hunted.
  - Bison should be hunted in a manner similar to other game species.
  - Hunting bison could impact their movements and distribution.
  - A huntable population of bison could provide benefits to the community and economy.
  - The presence of bison could impact the ability to hunt other species.

- **Genetics and Restoration Source Herds Issues and Concerns:**
  - The genetic makeup of a potential source herd should be evaluated.
  - Potential restoration bison should be free of cattle gene introgression.
  - Small amounts of cattle gene introgression would be acceptable.
  - Domestic bison could impact a wild herd's genetic makeup.
  - A herd should be of sufficient size to ensure genetic health.
  - Small herds should be managed intensively to maintain genetic health.

- **Legal Status, Classification, and Regulatory Issues and Concerns:**
  - Confusion exists as to the current status and classification of bison in Montana.
  - The classification of bison should remain as both livestock and wildlife.
  - Bison should only be classified as livestock.

- Legal status of bison in surrounding regions could have an impact on management.
- FWP should be the sole managing authority.
- Montana Department of Livestock should be the sole managing authority.
- Bison that are classified as wildlife should be managed by FWP and bison that are livestock should be managed by Montana Department of Livestock.
- There should be an agency liable for damages caused by bison.

- **Land Use and Land Management Issues and Concerns:**
  - Grazing leases and current uses of public land should be maintained if bison are restored.
  - Presence of bison could impact grazing leases and other current uses of public land.
  - Wildlife should be a priority on public land.
  - Public land should be used to support the economy.
  - Bison restoration should not impact recreational activities on public land.
  - Programs should be developed that allow for bison restoration and continuation or even an increase in public land grazing by domestic livestock.

- **Impact on Livestock, and Domestic Bison Producers Issues and Concerns:**
  - Coexistence of bison and domestic cattle on the Montana landscape is debatable or unknown.
  - There is debate over whether bison would breed cattle or prevent them from using resources.
  - Bison managed as wildlife could try to interact with domestic bison.

- **Ecological Impacts and Impact to Other Wildlife Issues and Concerns:**
  - Bison could have a positive impact on prairie vegetation and associated species such as grassland birds.
  - Bison could be an important part of a healthy ecosystem.
  - Bison could negatively impact riparian habitat.
  - Bison could potentially spread weeds.
  - There could be increased competition for limited resources with other wildlife species.
  - Impacts of wallows could be both positive and negative.

Economic and Community Impacts Issues and Concerns:
- Any specific issues and concerns related to socio-economic impacts and benefits would need further assessment within a site-specific Environmental Assessment.
- Bison could positively impact local economies through tourism, hunting, or other opportunities.
- Restoration and management of bison could be important to Montana's wildlife heritage and could strengthen Montana as a national leader in wildlife and outdoor opportunities.
- Bison could have negative or positive impacts to the tax base.

- There could be a loss of agricultural revenue if bison are restored.
- The threat of brucellosis could negatively impact Montana's beef industry, e.g. lower prices or additional restrictions on Montana cattle or beef.

- **Tribal Involvement and Cultural Connection to Bison Issues and Concerns:**
  - Tribal treaty rights both on and off reservations should be considered.
  - Bison should be restored due to their cultural and spiritual significance.
  - Concern was expressed over tribal participation in potential programs both on and off reservation lands.

- **Role of Federal Government and Other Agencies or Organizations Issues and Concerns:**
  - Bison restoration and management should be a cooperative effort between Montana and the federal government if federal land is involved.
  - The federal government should not be involved in the management of the state's wildlife.
  - Concern was expressed that other organizations and agencies could move forward with bison restoration in Montana if FWP does not.
  - The Montana Department of Livestock should play a role in the management of bison.
  - The Montana Department of Livestock should not have authority or a role in the management of bison.

- **Funding and Fiscal Issues and Concerns:**
  - Partial funding and resources should be provided by other organizations or agencies.
  - The cost of program alternatives should be examined and considered.
  - The limited funds of FWP should not be spent on bison.
  - A bison management program could have an impact on existing program budgets.
  - Taxes should not be used to fund bison restoration programs.

- **Research, Education, and Outreach Issues and Concerns:**
  - Further research as to how bison would behave and use the landscape should be explored.
  - A smaller herd should be used as a research opportunity.
  - Education and outreach relative to hunting, disease, and living with bison should be explored.

- **Potential Locations and Habitat Suitability Issues and Comments:**
  - Rangeland assessments should be completed to ensure that the habitat could support a healthy herd prior to any restoration.
  - Bison should only be restored to their historic range.

- **Potential Program Alternatives That Were Suggested:**
    - No Action: FWP should not move forward with managing bison as wildlife.
    - Restore bison to suitable prairie habitats as elk and deer have been restored.
    - Restore only a small herd or herds that could serve as a model for future efforts.
    - Restore a large herd or herds that are genetically viable and ecologically functioning.
    - Restore a herd that is of sufficient size to allow for a hunting program.
    - Manage bison in fenced herds.
    - Restore bison to Native American reservations only.
    - Confine bison to Yellowstone National Park and manage bison as livestock outside of the Park.
    - Restore bison on public lands, especially the Charles M. Russell National Wildlife Refuge.
    - Bison should be sent to Russia, Central Park, or the capital building in Helena.

- **Comments on this EIS and Scoping Process:**
    - FWP needs to act quickly in developing a management plan.
    - Only local input should be included since the program would have local impacts.
    - All citizens should be able to contribute since public land is involved.
    - There is a lack of trust in the planning process primarily related to how comments will be treated.
    - There is concern over FWP's ability to manage bison as wildlife.
    - There is support for FWP to be the agency that manages bison as wildlife.
    - There is support for Montana Department of Livestock to be in charge of bison and their management.

Chapter 2: Background Information

2.1 Introduction to Plains Bison

In 2010, FWP began the process of evaluating the opportunity for establishing a wild Plains Bison population somewhere within the state. As part of the evaluation process a public background document, *Background Information on Issues of Concern for Montana: Plains Bison Ecology, Management, and Conservation*, was created to compile the current body of knowledge pertaining to bison with an emphasis on issues most pertinent in Montana. The purpose of the background document was not to make management recommendations or decisions, but rather to create the foundation for an informed public dialogue about the future of bison in the state of Montana. For a more thorough examination of the subjects that are presented below, please refer to the complete background document. It is available on the FWP website (www.FWP.mt.gov). The following includes new information that has become available since completion of the background document.

2.1.1 Taxonomy and Systematics

The North American bison belongs to the genus of *Bison,* which is a separate genus from cattle (*Bos*). Traditionally, within the *Bison* genus there are two recognized subspecies, Plains Bison (*Bison bison bison*) and Wood Bison (*Bison bison athabascae*). The term bison within this document, unless otherwise specified, refers to Plains Bison.

2.1.2 Species Description

Bison are the largest terrestrial mammal in North America; however, the weight and measurements of bison differ considerably by age, sex, and among different populations. Males, referred to as bulls, average between 1,000 and 2,000 pounds, and females, known as cows, average between 800 and 1,000 pounds. Despite their large stature bison are extremely agile, with the ability to reach substantial speeds of approximately 30 to 35 mph, and jump up to six feet high (USFWS, 1997; Lott, 2002).

The head and front legs of a mature bison are covered with dense chocolate-colored hair. Bison hair is thinner than that of cattle, but is much denser with bison having "about ten times more hair per square inch of hide than do modern cattle" (Brink, 2008, p. 172). This hair plays a crucial role in insulating bison against extreme environmental conditions, as well as protecting bison from predatory attacks and injuries that may occur during male competition.

2.1.3 Historical Distribution

The historic distribution of bison covered most of the North American continent (Hornaday, 1889; Gates et al., 2010), however the largest concentration of bison occupied the Great Plains, which extends east to the Missouri River valley and west to the Front Range of the Rocky Mountains (Guthrie, 1980). Bison were primarily located in the lower elevations of the plains, although there are numerous reports of bison seasonally moving into mountain valleys and higher elevations within the Rocky Mountains (e.g. Fryxell, 1926).

2.1.4 Historical Abundance

Historical estimates as to the abundance of bison present at one time on the Great Plains have ranged from 15 to 100 million bison (Dary, 1989; Shaw, 1995). Recent studies of the environmental limitations of the semiarid grasslands that make up the Great Plains have lowered the estimated abundance of bison to no more than 30 million (Isenberg, 2000).

Bison were historically found throughout most of Montana. The observations of early travelers within the region, archeological records of a variety of bison kill sites, and the oral history of Native Americans support the estimates of historical distribution and abundance of bison. Figure 1 illustrates the inferred late prehistoric and early historical relative distribution and densities of bison within the state of Montana. Though populations of bison were found throughout much of the state, some regions had larger estimated year-round populations and higher population densities (Figure 1).

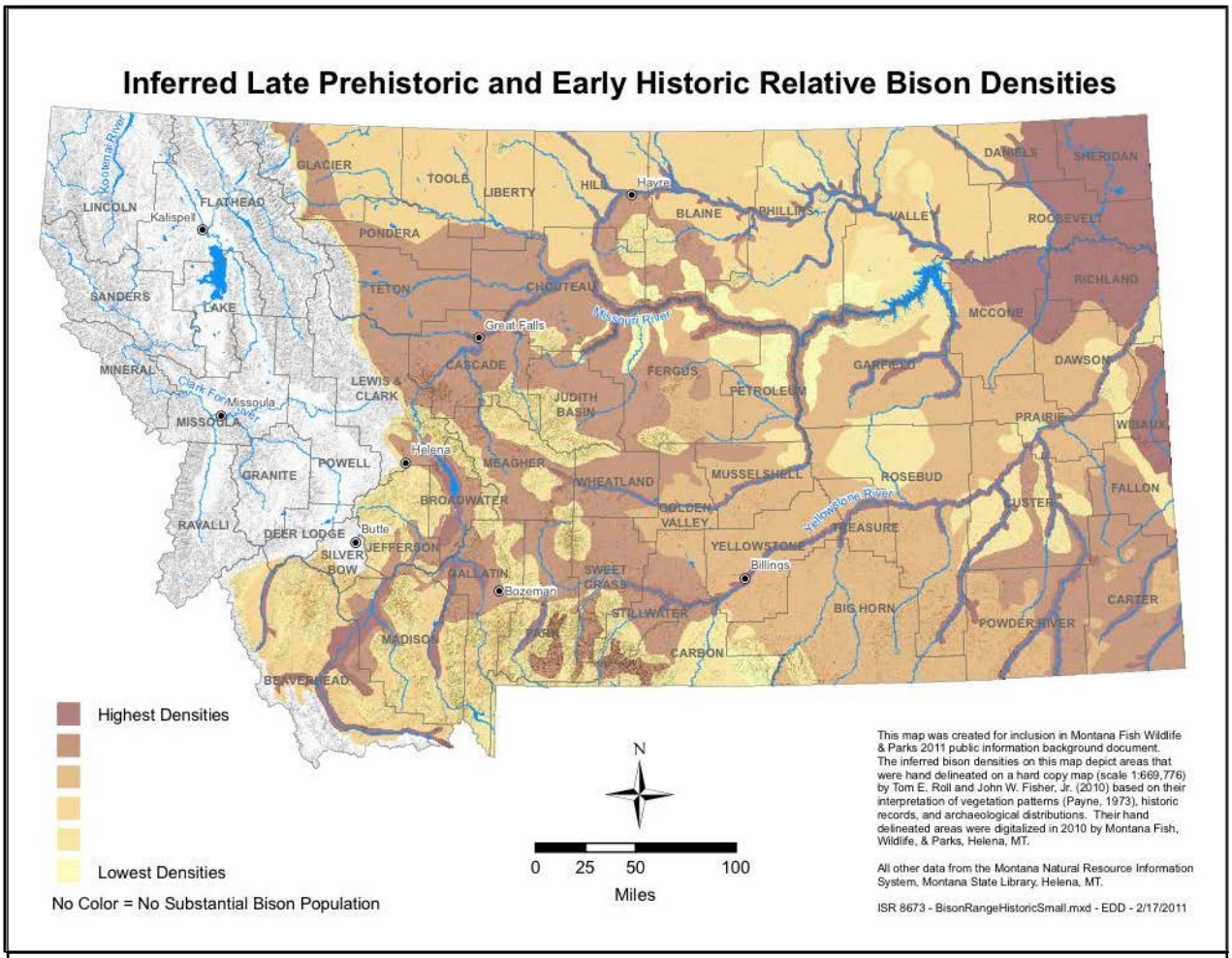

Figure 1: Inferred late prehistoric and early historic relative bison densities. Created by Roll and Fisher Jr. (2010).

Native American oral history, early explorer reports, and the observation of remains indicate that there were small populations of bison west of the continental divide. Analysis of the historical ecological makeup of the habitat of the western portion of Montana however, does not support the existence of large bison herds like those found to the east of the Rocky Mountains (Daubenmire, 1895; Mack and Thompson, 1982; Flores, 1996).

2.2 Species Status, Distribution, and Abundance

The status, distribution, and abundance of bison differs within the United States, Canada, and Mexico. North American bison have been listed as "Near Threatened" by the International Union for Conservation of Nature (IUCN). The IUCN has been assessing the conservation status of species on a global scale for the past 50 years. As of 2008, it was estimated that there were currently 20,504 Plains Bison in 62 conservation herds within the United States and Canada. Of those 62 conservation herds, 87% are believed to be within the original range of Plains Bison (Gates et al., 2010).

An important factor in evaluating the current status of bison is an examination of the number of bison within a herd compared to the number of individual bison that genetics experts recommend to conserve the genetic health of the species. A simulation model demonstrates that under ideal management conditions a bison population of 400 is likely to retain 90% of its current genetic diversity with a 90% probability for 200 years (Gross and Wang, 2005). Another simulation model found that a herd that fluctuates between 2,000 and 3,000 bison will lose an estimated 5% of genetic diversity each century through genetic drift (Perez-Figueroa et. al, 2010). In order to ensure that management does not impact the viability of herd genetics, experts recommend that conservation herds be maintained close to 1,000 animals in order to maintain a viable population (Freese et al., 2007; Dratch and Gogan, 2010; Gates et al., 2010, American Bison Society, 2011). Hedrick (2009) notes that herds should have an effective breeding population of 1,000, which would require a total population of 2,000-3,000 to avoid the impacts of inbreeding and to maintain genetic variation. Currently there are only five Plains Bison conservation herds that have over 1,000 individuals and 74% of Plains Bison conservation herds have populations of less than 400 individuals, with 32% having fewer than 50 (Boyd, 2003; Gates et al., 2010).

As of 2013, bison are listed by the Montana Natural Heritage Program (MNHP) and FWP as a "Species of Concern". Species of Concern "are native Montana animals that are considered to be 'at risk' due to declining population trends, threats to their habitat, and/or restricted distribution" (MNHP, 2010). FWP and MNHP have given bison an S2 state ranking and a G4 global ranking (MNHP, 2010; FWP, 2010a). An S2 status means the species is "at risk because of very limited and/or potentially declining population numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state" (FWP and MNHP; 2010b). The G4 global ranking means that the species is "apparently secure, though it may be quite rare in parts of its range, and/or suspected to be declining" (FWP and MNHP, 2010b). FWP has a clear obligation to use its resources to implement conservation actions that provide direct benefit to these species, communities, and focus areas" (FWP, 2005, p. 32).

Within Montana there is one public captive conservation herd, which resides within the National Bison Range (NBR) and is co-managed by the United States Fish and Wildlife Service (USFWS) and the Confederated Salish and Kootenai Tribes (CSKT). This is an actively managed herd, which is on a rotational grazing system and is annually rounded up to remove surplus animals and test for disease. The herd is managed at approximately 400 bison on 18,500 fenced acres. Surplus bison are culled through livestock sales and transfer to other tribes. Testing of the NBR herd found the presence of cattle DNA, both in mitochondrial DNA and in nuclear DNA (Ward, 2000).

The wild bison that inhabit YNP exhibit limited seasonal movement beyond park boundaries into neighboring regions of Montana. This population is considered to be the only population of Plains Bison that has continuously existed in the wild in North America. During the fall of 2014, the bison population of YNP was estimated at approximately 4,900. Over 700 bison were either culled or harvested by hunters in the winter of 2014-2015.

The bison that originate from the YNP herds have been designated as a species in need of disease management within the state of Montana and are managed under the IBMP (§87-1-216 MCA). The primary goals of the IBMP are "to maintain a wild, free-ranging population of bison and address the risk of brucellosis transmission to protect the economic interest and viability of the livestock industry in Montana" (IBMP, 2000, p. 1). Under current IBMP management, bison originating within YNP are not permitted to maintain a year-round population or presence in Montana and are actively moved back into the park by government officials, with the exception of those found in the Absaroka-Beartooth Wilderness. Under the IBMP, bison may freely migrate into the Absaroka-Beartooth Wilderness north of Yellowstone, including the upper portions of Hellroaring and Slough Creek, though the IBMP recognizes that due to the high elevations and rugged topography, few bison are expected to utilize this region.

Several adaptive management adjustments have increased the tolerance of bison in areas outside the Park since the original IBMP. Any management adjustments ensure that the agencies will "evaluate the effects of these adjustments and modify as necessary to… minimize the risk of transmission of brucellosis to livestock" (IBMP, 2011).

In March 2015, YNP and the state of Montana began a scoping process in preparation for a new EIS to revise the IBMP. While the existing plan from 2000 and associated adjustments has been effective at preventing brucellosis transmission and maintaining a viable herd, new data about general biology and disease prevalence, new federal rules relative to disease, public opinion shifting toward more tolerance for bison in Montana, and other changing circumstances justify a plan revision. (Visit http://www.ibmp.info for more information regarding the IBMP.)

2.3 Life History and Ecology

2.3.1 Description of Relevant Bison Behavior and Habitat

It is important to note that much of what is known about how bison may use different landscapes in Montana comes from historical observations, as bison were removed from

the state before European settlement. There are many unknowns about how a bison herd may behave and use any particular location in modern day Montana.

Bison were found throughout the prairies, arid plains and grasslands, meadows, river valleys, aspen parklands, coniferous forests, woodlands, and openings in boreal forests. There are also historical reports of mountain bison, which were Plains Bison that resided in high mountain habitats.

Bison will congregate in larger herds mainly during the summer breeding season, and primarily in favorable feeding habitat (Nowak and Paradiso, 1983; Bamforth, 1987; Berger and Cunningham, 1994a; Aune et al., 1998; Isenberg, 2000). Throughout the remainder of the year cows, calves, and immature males tend to form smaller "cow" groups averaging between 10 and 20 individuals (McHugh, 1972; Nowak and Paradiso, 1983; Isenberg, 2000; Long, 2003; Picton, 2005; FWP and MNHP, 2010a). The bulls tend to remain solitary or form small groups of up to five bulls during most of the year, joining with the cow groups only during the breeding season.

The type of habitat that a herd occupies can also have an effect on its size. Group sizes tend to be smaller in mountainous or mixed terrain than in open prairie (McHugh, 1972; Berger and Cunningham, 1994a; Gates et al., 2010). Historical reports indicate that the 'mountain' bison of YNP congregated usually in bands of 5-30, rarely more (Meagher, 1973). Observations indicate that habitat seemed to have a greater effect on the size of cow groups than bull groups. Herds using ravines and rolling hills were about half the size of herds using prairie habitats (Berger and Cunningham, 1994a). Bison are also known to congregate in larger groups around permanent sources of water, but then will separate to feed (Bamforth, 1987). Bison density averages from one to four per square mile depending on the range conditions (Long, 2003).

The home range of wild bison varies primarily with habitat productivity. As grassland ungulates, bison must modify their behavior to withstand wide spatial variations in resource quality and availability. The average home range of a bison herd extends from 18 to 62 square miles depending on the season and the quality of forage (Nowak and Paradiso, 1983; Long, 2003). Herds utilize smaller home ranges during the summer months and larger ranges during the winter. When in habitat of lower productivity, bison will increase the size of their home range. Bison move frequently within their home ranges, and tend to travel around 1.8 miles daily (Nowak and Paradiso, 1983; Long, 2003).

Historically some bison herds may have migrated a few hundred miles south in search of higher-quality winter habitat (Nowak and Paradiso, 1983; Long, 2003), but it does not appear bison "migrated" in the traditional sense if migration is defined as following a regular and predictable seasonal or annual route (Garretson, 1938; Roe 1970; Hart, 2001). The migration patterns of bison simply are not consistent from year to year (Meagher, 1973; Van Vuren, 1980; Nowak and Paradiso, 1983; Bamforth, 1987; Coppedge et al. 1999; Knapp et al., 1999; Lott, 2002; Long, 2003).

Migration is closely associated with locations of permanent water and forage quantity and quality due to seasonal changes and precipitation patterns. Bison appeared to move in response to local conditions of forage availability, as influenced by weather, fire, and previous grazing (Moodie & Ray, 1976; Hart, 2001). Historically fire, hunting pressure, and plagues of grasshoppers or locusts had a large impact on the migration of bison (Moodie & Ray, 1976).

It appears that bison are more likely to engage in seasonal altitudinal migration rather than in a large north-south migration. In northern regions, bison moved east-west seasonally from the plains into the bordering aspen parklands and rough country of the foot hills during winter weather, but not north-south (Garretson, 1938; Hart, 2001). Historical evidence indicates that "buffalo sheltered in the wooded areas in the coldest months of winter and, from spring until early winter, grazed on the open grasslands" (Moodie & Ray, 1976, p.46). Historically a large number of bison wintered on the northern plains. "Typical winter sheltering spots for bison included deep valleys of rivers, creeks, and coulees, thick groves of trees and brush, and hilly or broken country where there are options to move out of the wind" (Brink, 2008, pp. 62–63).

Bison would begin to move back out onto the plains as winter transitioned to spring. "Herds moved out of sheltered valleys and hilly country but stayed close enough to move back in case of all-too-common late winter storms" (Brink, 2008, p. 64). "In summer, especially late summer, water became the critical resource" (Flores, 1996, p. 7). During her study of bison in YNP, Meagher (1973) observed that during the spring bison moved from lower wintering valleys to higher summer ranges, and would then reverse this altitudinal migration in the fall.

Bison engage in non-grazing behavior, including wallowing and horning that influence grassland dynamics and are different from cattle behavior (McMillan & Pfeiffer, 2011). Long-term controlled studies comparing rangeland cattle and bison have found that higher levels of biodiversity are more commonly associated with bison occupation (Fox et al., 2012; Town et al., 2005). Bison presence also tends to maintain tall-grass prairies at higher levels of local and regional diversity than cattle (McMillan & Pfeiffer, 2011). Due to the differences in the non-grazing behavior of bison and cattle the species are not ecologically functional equivalents (McMillan & Pfeiffer, 2011).

Bison of all ages and sex classes engage in a behavior called wallowing, which involves rolling in soft dirt while scraping their horns and hooves against the ground (McMillan et al., 2000; Reynolds et al., 2003; Gates et al., 2010). This behavior forms a circular to oval-shaped bare soil depression (Coppedge et al., 1999) that collects rainwater and creates a microenvironment that supports species that differ from the rest of the ecosystem. The life span of wallows depends on how often they are used, the type of soil, and the size of the disturbance.

Bison of all age and sex classes also engage in a behavior referred to as horning, which involves the rubbing of an object with the head, horns, neck, or shoulders. Horning typically

involves rubbing on a shrub or small tree, though bison may utilize man-made objects as well.

2.3.2 Foraging Ecology and Diet Composition

Bison are ruminants with a four-chambered stomach system that allows them to effectively digest plant material. Bison typically forage between 9 to 11 hours daily, but will increase their foraging if the quality of food is low. Bison alternate between active foraging and passive ruminating to allow time for the microorganisms in their gut to break down the plant material. The large size of the bison allows for a larger digestion vat, thereby allowing bison to utilize lower-quality forage than other ungulates, such as elk, deer, and cattle (e.g., Peden et al., 1974).

Bison and cattle differ in the elevation and degree of slope in which they graze, with bison more often grazing on steeper slopes (Van Vuren, 2001). Cattle and bison display different foraging behaviors, with bison behaving more as energy maximizers (Nelson, 1965; Peden et al.,1974; Norland, 1984; Van Vuren, 2001; Fuhlendorf et al., 2010). During a study of bison in Theodore Roosevelt National Park, Norland (1984) observed that bison did not center foraging activities around permanent water sources, but were instead highly mobile in order to use different water sources. Bison also used temporary water sources, went without water for at least one day, and used snow instead of water when available. The increase of vertical distance from water caused a steep decline in cattle foraging; however, the situation resulted in only a slight decrease in bison foraging (Van Vuren, 2001).

The diet of the Plains Bison consists primarily of grasses, though bison will consume forbs and woody vegetation when their preferred vegetation is not readily available (Nowak and Paradiso, 1983; Foresman, 2001; Long, 2003; Burde and Feldhamer, 2005; Picton 2005). Bison's nutritional needs change seasonally and are related to the length of the day, with a metabolic rate decrease in the fall and winter. A mature bison gains and loses weight cyclically, with weight loss occurring in the fall and winter, and weight gain occurring in the spring and summer (Feist, 1999).

Bison have evolved the ability to plow away up to 18 inches of snow with their large low-hanging head in order to access the underlying vegetation (Meagher, 1978; Picton, 2005). This adaptation allows bison to effectively feed on natural sources during the winter season in conditions that may limit the foraging ability of other wild ungulates and may require the diet of domestic livestock to be supplemented.

2.3.3 Reproductive Biology

A female bison's ability to produce viable offspring is dependent on a number of factors including age, physical condition, and disease status. The age that a female first conceives varies among individuals and herd location (Reynolds et al., 2003). Females commonly conceive at two years of age and thus produce their first calf when they are three years old. Prime breeding years differ between herds, but tend to range from four to ten years of age (Berger and Cunningham, 1994a; Aune et al., 1998; Gates et al., 2010). The majority of males begin to reach sexual maturity in their second or third year; however, bulls that are

less than six years old tend to not yet possess the social maturity to successfully compete with other bulls for the opportunity to breed (Meagher, 1973; Reynolds et al., 2003; Picton, 2005). Bulls that are between seven and eight years old are the most competitive males, and therefore have the highest breeding success.

The breeding season of bison, which is referred to as the rut, tends to occur between July and September, with the majority of breeding occurring in July and August. A male bison will attempt to breed with as many females as possible during each breeding season in order to increase the number of viable offspring that carry his genes. Gestation and calving seasons can be influenced by factors such as location and climatic conditions (Aune et al., 1998; Reynolds et al., 2003; Gogan et al., 2005). Gestation in bison ranges from 9 to 9.5 months with the availability of spring forage being a major factor in the timing of births.

A cow delivers a single reddish tan calf, which is able to stand and suckle shortly after birth. Calves begin to graze after their first month, and learn food selection through observing the herd. Most calves are weaned within 8 to 12 months.

2.3.4 Demography and Population Dynamics

The rate of population growth is influenced by a variety of factors to include: sex ratio, age structure, quality and quantity of forage and habitat, and the immigration and emigration rate combined with the reproductive and mortality rates. The survival rate of calves varies dramatically across different populations, whereas adult survival rates are generally higher and less variable (Brodie, 2008). Survival rates for prime age adults are approximately 95% (Gates et al., 2010). Mortality may occur through predation, hunting, accidental drowning, parasites, and disease.

Another major factor that causes mortality in bison is climate. Winters with above-average snowfall and long freezes result in mortality in bison, as these conditions reduce foraging ability leading to poor animal condition and potentially death (Reynolds et al., 2003).

Pregnancy and birth rates vary within different herds and are affected by multiple factors including range condition, female body condition, and disease. While female bison may get pregnant most years, they do not always produce viable calves depending upon the severity of the previous winter (Aune et al., 1998). Calf survival varies drastically across different populations, but on average ranges from 40 to 90%, depending upon the severity of winter, predation pressures, and forage availability (Brodie, 2008; Gates et al., 2010).

The growth rate of bison populations is highly tied to adult survival, with small changes in adult survival having large effects on population growth rate (Fuller et al., 2007b). Growth rates tend to be highest in captive herds where there is an absence of predation, supplemental feeding, annual culling of surplus animals, and a sex ratio skewed to more females. Within wild populations, growth tends to occur at a slower rate (Gates et al., 2010).

2.3.5 Genetics

The genetic health of bison is one of the main focuses of their management as bison have undergone artificial hybridization with domestic cattle, been selectively bred for certain traits in private herds, undergone a vast reduction in population, and have been separated into small isolated populations. The modern Plains Bison descended from fewer than 500 animals that survived the extermination efforts of the late 1880s. The limited number of founder bison could have a large effect on the genetic variation of present-day herds, both public and private. Yet, recent studies have shown that reduction of the overall genetic diversity of bison may not have occurred to as great an extent as originally believed (Dratch and Gogan, 2010; Gates et al., 2010). Historically, the bison population did go through a severe bottleneck, but the population did not remain at low numbers for an extended period of time, and therefore modern populations appear to have retained a substantial amount of genetic diversity (Freese et al., 2007).

As noted in Bailey (2013), genetic extinction of the wild bison genotype has been occurring through five processes. These include: 1) initiating herds with few individuals having limited genetic diversity; 2) cross breeding with cattle genes; 3) inbreeding in small herds, 4) genetic drift in small populations; and 5) artificial selection by human intervention resulting in genotypic adaption to a captive or semi-captive environment. These factors have significant implications for the long term conservation of bison as wildlife.

An important factor in the conservation of genetic diversity within a bison population is the size of the herd and the sex ratio. There is a greater loss of genetic variation when the number of breeding animals is low (Dratch and Gogan, 2010). It is recommended that in order for a population to be considered of sufficient size for genetic purposes there should be over 1,000 animals and the size of the population should remain stable over time (Dratch and Gogan, 2010; American Bison Society, 2011). The American Bison Society (2011) prepared a number of recommendations following a meeting of genetics experts and bison managers. One recommendation is that conservation herds should be managed to retain maximum genetic variation thereby conserving the adaptive capacity and evolutionary potential of bison. Where possible, extraordinary efforts should be made to build conservation herds to an effective population size of at least 1,000 animals (American Bison Society, 2011).

Recognizing that many locations may not be suitable for herds over 1,000, it is recommended that a herd should have at least 400 animals to maintain 90% of its current genetic diversity with a 90% probability for 200 years (Gross and Wang, 2005) and the size of the overall population should remain stable over time. Geneticists recommend that any herd under 1,000 animals be actively managed to preserve genetic integrity (Dratch and Gogan, 2010; Gates et al., 2010). One way to manage for an increase in genetic diversity is to develop a metapopulation structure that allows for movement of individual bison between herds, thus allowing genetic variation to flow between the herds (Dratch and Gogan, 2010). It is also important that there be a sex ratio that is closer to 50:50 in order to allow competition between breeding bulls (Dratch and Gogan, 2010; Gates et al., 2010).

The Department of the Interior (DOI) Bison Conservation and Management group held the Bison Conservation Genetics Workshop in September 2008. The result of the workshop was an agreement on the basic tenets of genetic management for the USDI herds and discussion of different approaches to achieve these goals (Dratch and Gogan, 2010). The workshop participants established the criteria for a wild bison herd "as one with a large enough population size to prevent loss of genetic variation and with low levels of cattle or subspecies introgression, and subject to some of the forces of natural selection, including competition for breeding opportunities" (Dratch and Gogan, 2010, p. 2). Participants agreed that the desired minimum size of a population should be 1,000 individuals, which could be achieved through the establishment of a single population or the management of several smaller populations as a metapopulation (Dratch and Gogan, 2010). The participants evaluated the current status of the DOI herds and noted that while the herds meet the basic threshold for genetic integrity, most are managed well below 1,000 bison, and there are no management plans in place to manage these smaller herds as metapopulations (Dratch and Gogan, 2010).

The group also reached consensus that herds with no evidence of cattle hybridization must be safeguarded from potential introgression of livestock genes, and must be recognized as very important resources (Dratch and Gogan, 2010). The participants noted that while none of the DOI herds are subject to the full range of historic natural selective forces that influence genetic variation, management actions should maximize population size, minimize selection for docility and other traits related to domestication, strive for an even sex ratio considering differential survival, and minimally interfere with social behavior (Dratch and Gogan, 2010). Participants further recognized that DOI herds have a 'crucially important' role in long-term bison conservation (Dratch and Gogan, 2010). They noted that almost all DOI herds must be increased in size to avoid negative genetic effects, and since most of the herds are generally at or near capacity within federal boundaries, establishing satellite herds that can contribute to metapopulations is an important first step. Managing bison herds across current jurisdictional boundaries is also an important step to long-term bison conservation (Dratch and Gogan, 2010).

Bison and cattle do not naturally hybridize (e.g., Halbert and Derr, 2007), though breeding can be forced in captivity. When the bison population was extremely low, hybridization of bison and domestic cattle was attempted by early ranchers as a means to create offspring that exhibited the ruggedness and winter foraging ability of the bison and the meat production of the domestic cow.

The breeding of bison and cattle has caused an introgression of cattle genes into bison herds, which is a gene flow between populations that results from the hybrid offspring being bred back to the parental population (Boyd and Gates, 2006). The genetic integrity and natural genetic diversity of the species is compromised, as the introgressed DNA replaces portions of the original genome (Gates et al., 2010). While wild bison do not readily breed with domestic cattle, breeding can occur between the two species in captive and artificial settings. The majority of domestic bison producers no longer attempt hybridization (Boyd, 1914; Dary, 1989; Geist, 1996; Boyd and Gates, 2006).

Due to the limited number of bison in the early 20th century a significant number of both private and public herds were established or supplemented with bison that originated from herds that had a history of hybridization (Boyd and Gates, 2006). There has been a substantial effort to genetically test conservation herds in order to gain a better understanding of the genetic health of Plains Bison. When testing for cattle gene introgression in bison, there are two separate types of DNA that can be analyzed; mitochondrial DNA (mtDNA) and nuclear or autosomal DNA (nuclear DNA). There is evidence of cattle gene introgression in both mtDNA and nuclear DNA within public and private Plains Bison herds (Polziehn et al, 1995; Ward et al., 1999; Halbert and Derr, 2007; Dratch and Gogan, 2010). In herds where there are low amounts of cattle gene introgression, individual bison that have been identified as having domestic cattle ancestry through molecular markers have not been reported to be observably different than bison without domestic cattle ancestry (Hedrick, 2009).

The effects that cattle genes have on an individual bison are still being examined, but there are many managers and scientists that feel even bison herds with low levels of cattle-gene introgression can be of high conservation value when managed according to conservation criteria. Indicators of success such as restoring ecological function, adaptability, and natural selection should take priority over measures of genetic purity when bison free of cattle gene introgression are unavailable for restoration (American Bison Society, 2011).

DNA technological advances are displaying a greater prevalence of cattle gene introgression than previously documented and the genetic status of existing herds is ever changing with new techniques. At this point in time, only two public herds are currently considered free of cattle introgression, the YNP herd and the Elk Island herd in Alberta, Canada. The Henry Mountains herd in Utah is also considered free of cattle introgression, though limited testing has occurred. Private herds such as Turner Enterprise's Castle Rock herd in New Mexico and the American Prairie Reserve's (APR) herd are considered free of cattle gene introgression (Turner Enterprises Inc., pers. comm.; D. Jorgensen, WWF, pers. comm.). The Castle Rock herd descended from bison that were transferred in the 1930s from Yellowstone National Park (YNP) (Gates et al., 2010). The APR herd originated from Elk Island.

The bison in existence today that are likely to be free of cattle genes comprise only a fraction of the overall Plains Bison population. Managers of some of the privately owned and public herds are working to implement test and cull management practices in order to increase the genetic purity of their respective herds.

2.3.6 Reportable Diseases

As with any species, wild or domestic, bison may carry a number of pathogens or parasites. The following section examines the diseases that have the potential to infect bison, are transmissible to livestock, and are "reportable" within the state of Montana. It is important to note that many existing restoration herds are free of reportable diseases of concern, and therefore source bison for new herds can be obtained that are free of reportable diseases.

Diseases of concern discussed below can be managed within wild herds and are often absent in wild bison populations. The use of hunter test kits has been successful in monitoring for diseases of concern. For example the House Rock herd in Arizona, the Delta bison herd in Alaska, and the Henry Mountains Herd in Utah are all actively monitored for brucellosis from hunter-collected blood samples. None of the herds have shown any evidence of brucellosis or other diseases of concern to date. The Utah Division of Wildlife Resources captures and tests a certain percentage of bison in the Book Cliff herd on an annual basis for brucellosis. The herd is currently free of reportable disease. Wyoming Game & Fish has a mandatory hunter test kit return program that has a return success rate of 98%.

Many of the management agencies with restoration herds have disease contingency plans in place. The goal of these plans is to establish procedures to quickly and effectively respond should a disease of concern be detected. Often these contingency plans are developed in conjunction with the state veterinarian or Department of Livestock. The Delta bison herd plan, for example, is designed to respond to diseases that are transmitted from livestock to bison or vice versa. "Diseases with relatively mild symptoms that do not present a significant risk to bison, livestock or other wildlife species will be monitored by the serologic survey" (DeBois and Rogers, 2000, p. 14). "Diseases that produce moderately severe symptoms in bison and/or diseases of unknown pathology for other wildlife will also be monitored with a serologic survey. In addition, the Department may limit contact between bison, livestock and other wildlife species by managing the Delta bison herd for fewer bison" (p. 14). "Diseases that produce extremely severe symptoms that may be devastating for bison, livestock and/or other wildlife species may require reducing the risk of transmission from bison to livestock or other wildlife by one or more of the following actions: 1) Place a portion or all of the herd in captivity and test them for the disease, slaughter infected animals or use disease-free captive bison to reestablish the herd; 2) Slaughter the existing herd and re-establish with disease-free bison" (DeBois and Rogers, 2000, p. 14).

In addition to the reportable diseases that are reviewed below, bison have the potential to become infected with other diseases. One such disease that has an impact on bison, but is not a reportable disease of concern for livestock in Montana is Mycoplasma bovis. Mycoplasma bovis was responsible for a large number of bison deaths on a private bison ranch in Montana in 2011.

Anthrax

Anthrax is a disease caused by a spore-forming bacterium, *Bacillus anthracis,* (MDOL, 2010a). The bacteria can affect all mammals, but ruminants such as cattle, sheep, bison, and goats are the most susceptible (MDOL, 2010a). Anthrax is a zoonotic disease, which means that it is possible for humans to become infected with the cutaneous form, known as Wool-sorters disease, from close contact with infected animals or their by-products, such as heads or hides (Gates et al., 2010; MDOL, 2010a; J. Rankin, MDOL, pers. comm.). Anthrax spores exist in soil, and tend to grow and contaminate the soil surface following periods of precipitation and cooler weather that are followed by extended periods of hot, dry conditions (van Ness, 1971; MDOL, 2010a). Anthrax may be spread throughout a region by

streams, insects, animals and birds, animal waste, disturbed carcasses, wastewater effluent from water treatment plants, or inadequately sterilized bone meal and fertilizers made from contaminated material (Hugh-Jones and Hussaini, 1975; Gates et al., 2010; MDOL, 2010a). An animal may become infected through the ingestion of spores in contaminated food and water, or through inhalation (Gates et al., 2010; MDOL, 2010a).

Anthrax infection can be determined through testing, and may be treatable in captive bison and livestock with antimicrobials, such as penicillin and oxytetracycline (MDOL, 2010a; Gates et al., 2010). Although anthrax is not treatable in free-ranging wildlife, there are effective vaccines for captive bison and livestock (MDOL, 2010a; Gates et al., 2010).

Anthrax outbreaks occurred in herds of domestic cattle in Montana in Roosevelt County in 2005, and in two isolated regions of eastern Montana in 1999 (MDOL, 2010a). An outbreak of anthrax occurred in domestic bison in 2008 within a private herd in Gallatin County, killing over 287 bison (Ronnow, 2008; Person, 2010a). The ranch began a program of vaccination, and did not experience additional deaths until July, 2010, when anthrax was isolated from the carcass of a bison calf that had been killed by predators (Person, 2010a; J. Rankin, MDOL, pers. comm.). Anthrax was detected within wild bison in southern Saskatchewan. That population was reduced by approximately half (G. Vaadeland, pers. comm., 2014). In addition there have been anthrax outbreaks in several Wood Bison herds that also had significant population impacts. A measure utilized to prevent the spread of anthrax in wild bison herds is the monitoring and disposal of affected carcasses, as carcass scavenging may result in environmental contamination (Nishi et al., 2002).

Bluetongue

Bluetongue is an insect-borne, viral disease that primarily affects sheep, but can occasionally affect goats, deer, and antelope and very rarely affect cattle (APHIS, 2010a). Bison are susceptible to the virus, and infection has been observed under field and captive conditions (Dulac et al., 1988). Infection of humans has not been reported (APHIS, 2010a). The virus is noncontagious and cannot be transmitted between species without the presence of the insect carriers, which are various species of *Culicoides* midges (Stelljes, 1999; APHIS, 2010a).

The distribution and prevalence of the virus is dependent upon seasonal conditions and the presence of the insect vectors and susceptible animals. The midges prefer warm, moist conditions, and are most prevalent after periods of warmth and precipitation (APHIS, 2010a). Bluetongue is less common in northern regions (Gates et al., 2010). The virus does not survive outside of the host animal or the insect vector, and is not transmitted through animal carcasses or products (APHIS, 2010a).

The virus may cause mortality within sheep, but mortality rates within the United States have been reported around just 5% (Stelljes, 1999). There is no known treatment for bluetongue, but the prevention of infection can be increased by using a combination of quarantine and movement control, treatment and husbandry practices to control the insect vectors, and zoning to define infected and disease-free regions (APHIS, 2010a). Infection of bison has not been widely reported in North America (Gates et al., 2010). The testing of

several public bison herds has not found seroreactors for the bluetongue virus (Gates et al., 2010). The USFWS found that bison that were located near a recent outbreak of bluetongue in deer did not show signs of infection (Gates et al., 2010).

Bovine Anaplasmosis

Bovine anaplasmosis (anaplasmosis) is a disease caused by *Anaplasma marginale,* which is a rickettsia that parasitizes the red blood cells of host animals (Davidson and Goff, 2001; Gates et al., 2010). There are multiple species of *Anaplasma* within the order Rickettsiales that infect domestic cattle, sheep, goats, and a variety of wild ruminants including deer, elk, and bison (Davidson and Goff, 2001). It is not infectious to humans (Gates et al., 2010). Anaplasmosis survives and reproduces within a host and is transmitted primarily through blood-sucking insects (Gates et al., 2010). The most prevalent spreading of the disease occurs through ticks since the rickettsia can survive and reproduce within the tick (Davidson and Goff, 2001). Transmission from biting insects, including flies and mosquitoes, occurs less frequently because the rickettsia remains viable for only a short period of time on the insect's mouthparts and does not survive and reproduce within the insect (Davidson and Goff, 2001). Transmission has also been reported to occur through vaccination needles or dehorning and castration equipment (Davidson and Goff, 2001).

Most infections of anaplasmosis are subclinical, meaning those infected do not display obvious symptoms. Domestic livestock may have acute, subacute, or chronic infection (Davidson and Goff, 2001). Bison may be more resistant as experimentally infected bison calves demonstrated only mild clinical signs (Zaugg and Kuttler, 1985; Gates et al., 2010). Tests have been developed to identify anaplasmosis within domestic livestock, but serodiagnosis tests have not been as reliable for wildlife, often generating false results. Anaplasmosis has been managed within domestic livestock including domestic bison through vector control, vaccination, and antibiotic therapy (Davidson and Goff, 2001). These management programs are not logistically feasible for wildlife, and have not been implemented since the disease does not tend to compromise the health of wild bison.

Anaplasmosis is a disease of international regulatory concern, and therefore impacts livestock trade between Canada and the north-central and northwestern United States (Gates et al., 2010). Bison are a known host of *A. marginale* anaplasmosis (Gates et al., 2010). Naturally occurring anaplasmosis infection has occurred on the National Bison Range, where 15.7 % of the bison have tested positive (Zaugg and Kuttler, 1985; Gates et al., 2010).

Bovine Brucellosis

In Montana, Bovine brucellosis (brucellosis) is the primary disease of concern that affects the management of bison. Brucellosis is an infectious, contagious disease caused by a bacterium of the genus *Brucella* (Thorne, 2001; MDOL, 2010c). Brucellosis was first detected in wildlife in the early 1900's and was most likely introduced into wildlife populations through contact with infected domestic livestock. The bison herd of YNP is infected with brucellosis, which has large implications on the way the herd is managed. Treanor et al. (2011) note "bison management practices used to prevent brucellosis transmission to local cattle conflicts with the goal of conserving bison and the processes

that sustain them (e.g. migration) (Treanor et al., 2011, p. 1325). Bison programs in other regions outside of the Greater Yellowstone Area (GYA) do not have chronic brucellosis infection, and the majority have been free of brucellosis since their development.

In 2011, new national regulations were developed that change the way brucellosis is managed so that a state no longer loses its brucellosis-free status when infection is detected (APHIS Veterinary Services, 2009; Official Order No. 10-01-D). Since that time, there have been cases of brucellosis in domestic livestock within Montana, but these have been managed on a herd by herd or individual animal basis with a shift from herd depopulation to the development of risk-based affected-herd management plans (APHIS Veterinary Services, 2009).

Brucella has six species, each with their own principal host. Bovine brucellosis is caused by the species *Brucellosis abortus,* whose primary hosts are cattle and bison (Thorne, 2001; Gates et al., 2010). Elk (*Cervus elaphus*) are also susceptible to *Brucellosis abortus*, and appear to contribute to the interspecies transmission in the GYA (Davis et al., 1990; Rhyan et al., 1997; Beja-Pereira et al., 2009; Gates et al., 2010; Anderson et al., 2012). Higgins et al. (2012) reinforce earlier conclusions that elk constitute the most likely reservoir for this pathogen among GYA wildlife. Seroprevalence rates among elk herds in the GYA range from 8% to 60%, while in bison herds, seroprevalence ranges from 11% to 75%" (Higgins, et al., 2012).

A study by Proffitt et al. (2010) found that despite high levels of spatial overlap between elk and bison within YNP the rates of elk exposure to *B. abortus* were similar to rates of exposure in other GYA free-ranging populations not in contact with bison, and lower than rates in elk populations associated with winter elk feeding programs. Proffitt et al. (2010) note that it therefore "appears that the high degree of spatial overlap with bison during the period of transmission risk has little impact on elk exposure to *B. abortus*" (p. 287). DNA genotyping has indicated that there is a relatively high genetic divergence between the *Brucellosis abortus* found in elk and that found in bison, which suggests that the disease is not extensively exchanged between the two species (Beja-Pereira et al., 2009; White et al., 2011a).

Brucellosis is transmittable to humans and causes undulant fever, which is treatable (Thorne, 2001; MDOL, 2010c). The disease is transmitted to humans through consumption of unpasteurized milk or through direct contact with infected animals during birthing, abortion, or in slaughterhouses (MDOL, 2010c). "Infection by *B. abortus* is rarely fatal in humans, but can cause severe, reoccurring, fever-like symptoms. Humans cannot pass the disease to animals or other humans" (White et al., 2011a, pp. 15–16). It is B*rucella suis*, which affects pigs, not *Brucella abortus* that is listed on the Center for Disease Control and Prevention's list of bioterrorism agents and diseases. However, the listing of *Brucella suis* makes it very difficult and expensive to conduct research on all of the Brucella species.

Brucellosis does not appear to be able to replicate outside of a host, but it can survive in certain environments and under certain conditions (Thorne, 2001, Aune et al., 2009; 2012). A study by Aune et al. (2009; 2012) found that Brucella bacteria could persist on fetal

tissues, soil or vegetation for 21-81 days depending on month, temperature, and exposure to sunlight. Soil, vegetation, and tissue at birth or abortion sites of infected bison can remain infectious for up to 43 days in April and 26 days in May (Aune et al., 2009; 2012). Bacteria purposely applied to fetal tissues persisted longer in February then May, but did not survive on tissues beyond the 10th of June regardless of when they were put out (Aune et al, 2012). Scavengers consume most aborted fetuses and, therefore, maintaining a complete assemblage of scavengers enhances the rapid removal of potentially infectious tissues (Aune et al., 2012).

Within cattle and bison, the disease tends to localize in the udder or reproductive organs and perpetuates naturally through growth in the female reproductive tract (Cheville et al., 1998; MDOL, 2010c). The disease is transmitted primarily though oral contact with an infected fetus, calf, or placenta; through contaminated feed or water; or through licking the genitals of an infected female after a birth or abortion (Thorne, 2001; MDOL, 2010c; Gates et al., 2010). The study by Aune et al. (2012) suggests that contact with infected fetal tissues could be a significant risk factor for inter- and intra- species transmission of brucellosis among native ungulates throughout the GYA, as well as between domestic livestock and wildlife species. Studies have indicated that male bison that are infected with brucellosis do not appear to transmit the disease to a female through breeding (Thorne, 2001).

The most obvious indication of infection within a pregnant animal is abortion, birth of weak calves, and vaginal discharge (MDOL, 2010c). More than 90% of infected bison will abort during their first pregnancy; this rate decreases to an abortion rate of 20% after the second pregnancy, and to nearly zero after the third, due to naturally acquired immunity (Davis et al., 1990; Davis et al., 1991; Gates et al., 2010).

There are tests to determine if an animal is infected with brucellosis; however, accurate testing can be difficult to achieve due to false negative cultures, which relate to the difficulties in isolating bacteria from chronically infected animals (Cheville et al., 1998; Gates et al., 2010). Brucellosis may be identified through the detection of antibodies in the blood; however, the presence of antibodies does not imply current living infection and can lead to an overestimation of the true level of infection (Cheville et al., 1998; Gates et al., 2010). “In bison, B. abortus antibodies are long lived (Rhyan et al, 2009); thus, seroprevalance overestimates the level active infection (Roffe et al., 1999) by failing to distinguish between infected and recovered animals (i.e. bison that have cleared the bacteria)” (Treanor, et al., 2011, p. 1325). New tests have been developed that do not look for the antibodies, but for the antigen/antibody complexes (K. Aune, WCS, pers. comm.). It is possible for a cross-reaction to occur in false positive results due to exposure to bacteria that is similar in structure to brucellosis (N. Anderson, FWP, pers. comm.).

Recent studies indicate that infection rates appear to be age dependent. Treanor et al. (2011) concluded that active B. abortus infection in Yellowstone bison is age dependent, allowing infection probabilities to be estimated based on age and quantitative diagnostic tests. The study indicates Yellowstone bison acquire B. abortus infection early in life (0-5

years of age) and typically show elevated antibody levels as they grow older (5+ years of age (Treanor et al., 2011).

Currently there is no treatment for animals that have been infected with brucellosis (MDOL, 2010c). Many bison develop immune responses, but do not become free of the bacteria (Cheville et al., 1998). The MDOL (2010c) encourages the testing, vaccinating, and isolation of replacement stock, separation of domestic livestock from wild herds that are infected, maintenance of clean calving environments, and use of gloves when assisting in calving or abortions to reduce the transmission of brucellosis. There are two vaccines for brucellosis in domestic cattle. Strain RB51, is preferred to Strain 19 and does not have as many adverse effects on cattle as Strain 19. StrainRB51 does not interfere with the accuracy of diagnostic tests as Strain 19 does (Cheville et al., 1998). Strain RB51 is approximately 50% effective in bison (Olsen et al., 2009) and has been shown to induce endometritis, placentitis, and abortion in adult bison, though it is believed that this may be related to the timing and location of the injection (Palmer et al., 1996; N. Anderson, FWP, pers. comm.). Strain RB51 does not appear to have significant adverse effects on bison calves (Roffe et al., 1999), and has been provisionally approved for use in bison, though its safety and efficacy still remain unclear (Gates et al., 2010). Efforts to develop additional vaccines are limited by the resources required by the Center for Disease Control's listing of B*rucella suis*.

Brucellosis Management

Within Montana, the wild bison of YNP are considered to be chronically infected with brucellosis (Cheville et al., 1998), and a number of management actions have been designed to reduce seroprevelance and prevent transmission. Such actions include vaccination, temporal and spatial separation from domestic livestock, distribution management, quarantine, capture, testing, and slaughter. The practice of vaccinating, testing, and slaughter has been successfully used to eliminate brucellosis in the Henry Mountains, Wind Cave National Park, and Elk Island National Park herds (Gates et al., 2010).

A quarantine program for eliminating brucellosis was designed for Wood Bison during the Hook Lake project and was considered successful (Nishi et al., 2002; Gates et al., 2010). In 2005, FWP and the US Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) developed a similar Quarantine Feasibility Study (QFS) in order to develop quarantine procedures that would allow YNP bison to be accepted as free of brucellosis. In turn, these bison are suitable for the establishment of new herds or to augment existing populations in order to preserve bison genetics and increase the number of conservation herds. The quarantine protocols and research data gathered at the bison quarantine facilities in Corwin Springs, Montana have established processes and monitoring methods that have yielded bison that are seronegative for brucellosis. Results of the study were published in the March 2014 edition of the Journal of American Veterinary Medical Association.

The first two research groups of YNP bison that completed the QFS protocols are considered by APHIS to be free of brucellosis. In 2009 after phase one of the protocols were

completed, FWP released a request for proposals to identify a location where the 83 research bison could be kept through a 5-year monitoring period. Turner Enterprises' Green Ranch near Gallatin Gateway Montana was selected following completion of an Environmental Assessment (EA). Turner Enterprises assumed management responsibility and cost for the bison in return for 75% of the offspring born under their care. The monitoring period ended in 2014, at which point FWP transferred 139 bison from the Green Ranch to the Fort Peck Reservation following completion of an EA and signing of a Memorandum of Understanding (MOU) with the Tribes. Terms of the 2104 MOU are very similar to those of the 2012 MOU referred to below.

In 2012, the final group of 64 research bison completed their phase one protocols and again FWP released a request for proposals to identify a location for the monitoring period. The selected location was the Fort Peck Reservation following completion of an EA and the signing of a MOU with the Tribes. One of the terms of the MOU is that FWP retains the right to request up to twenty-five percent of the progeny of the QFS bison for future bison conservation on other tribal or public lands, in addition to requirements of access to the bison for the phase two monitoring protocols. A portion of these QFS bison were subsequently transferred to the Fort Belknap Tribes for the remainder of the monitoring period under the same terms as the QFS bison remaining on Fort Peck tribal lands.

As the prevalence and distribution of brucellosis within the United States has been greatly reduced due to effective eradication and testing programs, APHIS developed a strategy that enables a more effective and efficient application of limited resources toward minimizing disease risk (APHIS Veterinary Services, 2009; Official Order No. 10-01-D). In 2011, new regulations were developed to manage brucellosis on a herd-by-herd basis and a state no longer loses brucellosis-free status upon detection of infection in a herd. There has been a shift from herd depopulation to the development of risk-based affected-herd management plans (APHIS Veterinary Services, 2009).

This strategy moves away from a whole state approach and establishes disease management areas that are collaboratively managed by the state and federal government, thus minimizing the burden on individual states (APHIS Veterinary Services, 2009). This design allows for a more effective approach to disease management and minimizes the economic impact on producers (APHIS Veterinary Services, 2009). Under the new strategy the status of the entire state is not affected based on the infection of individual herds (APHIS Veterinary Services, 2009).

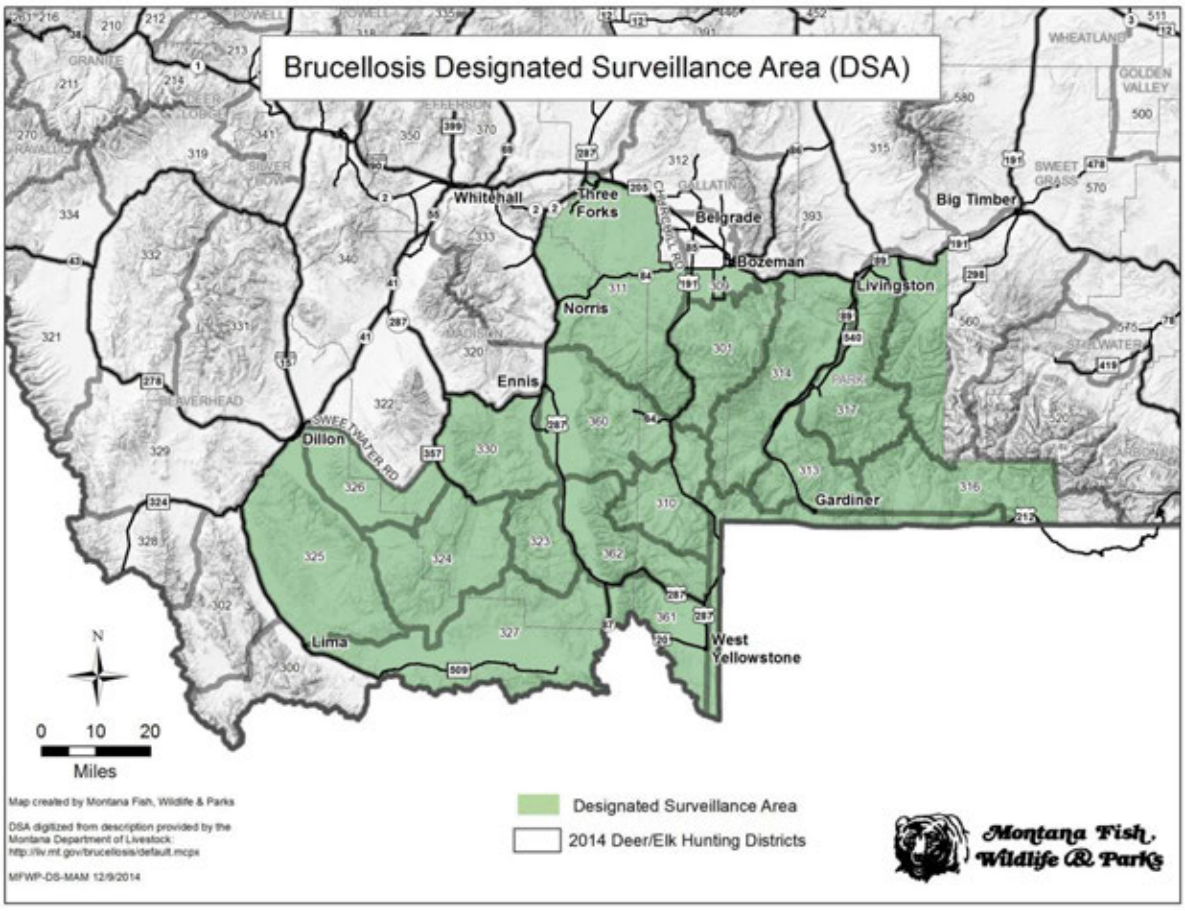

Figure 2: Designated Surveillance Area (DSA) for brucellosis monitoring around Yellowstone National Park.

The new regulations and Official Order No. 10-01-D established a Designated Surveillance Area (DSA) in certain counties in Montana. The Montana Board of Livestock adopted boundary changes in 2011 and 2012 to encompass an area south and southeast of Dillon due to the finding of brucellosis exposed elk within the areas. In 2014, the Montana Board of Livestock approved a boundary change to include an increased area between Norris and Three Forks (Figure 2). The order also outlines the requirements for brucellosis vaccination and testing of domestic livestock within Montana by establishing the surveillance and vaccination requirements for brucellosis. MDOL reimburses directly for testing and for adult vaccination costs (MDOL, 2013). In 2013, 45,131 cattle were tested at a cost of $364,629 and in the first half of 2014, 18,710 cattle were tested at a cost of $163,620. Montana and APHIS have begun operating under the new regulations and despite the discovery of infected domestic herds, the state has not lost its brucellosis-free status.

Bovine Spongiform Encephalopathy

Bovine spongiform encephalopathy (BSE), which is also referred to as "Mad Cow Disease," is one of the transmissible spongiform encephalopathies, which is caused by rogue, misfolded protein agents called prions that are lacking nucleic acids (Prusiner, 1982; Gates et al., 2010). BSE was identified in bison in zoological collections in the British Isles, though there has not been a case of BSE reported in bison in North America (Kirkwood and Cunningham, 1994; Gates et al., 2010). There have also been no reported wildlife cases of BSE in North America.

Research has shown that an animal becomes infected with BSE through the consumption of feed that is derived from infected animals (MDOL, 2010b). In order to prevent BSE in Montana, the MDOL issued an official order in March 2001, which states that "animal protein derived from mammalian tissues shall be prohibited in ruminant feeds in Montana" (Official Order No. 02-01-001).

BSE is a chronic degenerative disease that affects the central nervous system of the infected animal. Though there are tests for BSE, there is not a treatment, and death tends to occur within six months of infection (MDOL, 2010b). The human consumption of BSE-contaminated food causes the new variant Creutzfeldt-Jakob disease, which is fatal in humans (Gates et al., 2010).

Bovine Tuberculosis

Bovine tuberculosis (BTB) is a chronic and progressively debilitating contagious disease caused by a bacterium that is part of the Mycobacterium group (MDOL, 2010e). BTB has the largest range of hosts of the Mycobacterium group with the ability to infect all warm-blooded vertebrates (MDOL, 2010e). Cattle and bison are the primary hosts for BTB, making them susceptible to infection and allowing the bacteria to grow and spread within them under natural conditions (Gates et al., 2010). BTB is zoonotic and therefore can be transmitted from livestock and wildlife to humans (MDOL, 2010e). Human infection is rare, and treatment requires six to nine months of antimicrobial drugs, but the treatment success rate is more than 95% (Gates et al., 2010). BTB replicates and grows within a host, but can only survive outside a host for a few weeks (MDOL, 2010e). The bacteria cannot tolerate prolonged exposure to heat, direct sunlight, or dry conditions, but under cold, dark, and moist conditions it can survive (MDOL, 2010e).

An animal or human becomes infected with BTB primarily though inhalation or ingestion of unpasteurized milk (J. Rankin, MDOL, pers. comm.). Microscopic droplets, or aerosols, containing the BTB bacteria are expelled from the infected animal through exhaling or coughing, and in turn may be inhaled by a susceptible animal or human (MDOL, 2010e). Infection of offspring may occur through ingestion of contaminated milk, and humans may become infected through the consumption of unpasteurized milk from infected cows (MDOL, 2010e). Infection may also occur through communal water sources contaminated with saliva or other discharges from infected animals (MDOL, 2010e). Once the bacterium has entered a new host, it may take many months to develop due to its slow growth rate. It is also possible for the bacteria to remain dormant within a host without causing the disease (MDOL, 2010e).

The signs and symptoms of BTB often do not become apparent until the advanced stages of the disease (MDOL, 2010e). As infection progresses it leads to a generalized stage, which causes weakness, debility, reduction in fertility, and eventually death (Clifton-Hadley et al., 2001; Gates et al., 2010). The immune response that results from a BTB infection allows detection of the disease through tuberculin skin tests, though this is not an effective test for wildlife as it requires a three-day waiting period for the results and may produce false positives that require further testing (MDOL, 2010e; N. Anderson, FWP, pers. comm.). There currently is not an effective vaccine for BTB, however, there is evidence that individual domestic animals can be treated through the long-term use of antibiotics (Gates et al., 2010). This treatment is not practical for wildlife due to the need for long-term containment and the high cost of therapy (Gates et al., 2010).

Current endemic infection within bison has only been documented in and around Wood Buffalo National Park in Canada (Clifton-Hadley et al., 2001; Gates et al., 2010). There have been no reported cases of BTB within bison herds in Montana.

Bovine Viral Diarrhea

Bovine viral diarrhea (BVD) is a disease caused by a virus that is a member of the *Pestivirus* genus (Van Campen et al., 2001). BVD infects a variety of domestic and wild ruminants (Loken, 1995; Van Campen et al., 2001). The virus is very common in cattle in North America, but there are few confirmed cases of pestivirus-caused disease in wild ruminants (Van Campen et al., 2001; Gates et al., 2010). BVD poses no known threat to humans (Gates et al., 2010). The virus is mainly transmitted to wildlife through interactions with domestic livestock, as the principal reservoirs of BVD are persistently infected cattle and sheep (Van Campen et al., 2001; Gates et al., 2010). BVD is transmitted from persistently infected animals to susceptible animals through direct contact, aborted fetuses, fetal membranes, secretions, and shared food or water sources (Van Campen et al., 2001). The factors that influence the persistence of BVD in a population are size and density, herd behavior, the timing of reproduction, and the survivorship of offspring (Van Campen et al., 2001). There is evidence of BVD in bison in the GYA, and positive antibodies were detected in 31% of tested bison within YNP (Williams et al., 1993; Taylor et al., 1997). Pastoret et al. (1988) suggest that wildlife do not play a determinant role in the transmission of BVD to domestic livestock.

Infection within wild ruminants and cattle depends upon the immune status of the animal, the route of transmission, and the virulence of the isolate (Van Campen et al., 2001). Though rare, persistently infected cattle may eventually develop mucosal disease, which results in severe diarrhea, dehydration, fever, loss of appetite, and often, death (Van Campen et al., 2001; World Organization for Animal Health, 2009). There are tests to determine the presence of the antibodies that occur during exposure to BVD, and domestic livestock can be vaccinated (Van Campen et al., 2001). Though there does not appear to be a proven treatment, animals can develop immunity (Van Campen et al., 2010). Maintaining a closed herd and quarantining replacement stock is recommended to reduce the chance of infection. Maintaining a clean environment and preventing contact with biological waste and birthing fluids can also reduce the risk of infection (Van Campen et al., 2001).

Johne's Disease
Johne's disease, or paratuberculosis, is caused by the bacterium *Mycobacterium avium,* subspecies *paratuberculosis,* which occurs worldwide in a variety of wild and domestic ruminants including bison, cattle, and sheep (Buergelt et al., 2000; Williams, 2001; Gates et al., 2010). Johne's disease typically enters a herd when a healthy but, infected animal is introduced. An animal is most susceptible to the disease during the first year of life. Infection occurs when the newborn swallows a small amount of infected manure from the birthing environment or the udder of an infected mother. Infection may also occur while the animal is still in utero or through the milk and colostrum (APHIS, 2010b). The bacterium that causes this disease may survive in the soil or water for over a year, but will not grow and multiply outside the host (APHIS, 2010b). Humans are not at risk of Johne's disease from either livestock or wildlife (Gates et al., 2010).

The clinical signs of the disease rarely present themselves until two or more years after the initial infection. There is no known treatment for Johne's disease, and the disease typically leads to mortality. The best ways to prevent the spread of Johne's disease are the maintenance of a clean birthing environment, the removal of females that test positive from the herd, the removal or culling of offspring born to infected females, implementation of practices to prevent manure contamination of feed, and replacement of stock from low-risk herds (Gates et al., 2010; APHIS, 2010b). There have not been any reports of Johne's disease within conservation herds of bison, though some commercial herds have had cases (Gates et al., 2010).

Malignant Catarrhal Fever (sheep associated)
Malignant catarrhal fever (MCF) is a disease caused by a virus of the genus *Rhadinovirus* (Gates et al., 2010). There have been at least ten MCF viruses recognized worldwide, and five have been linked to disease within sheep, goats, cattle, and pigs (Gates et al., 2010). Within bison, MCF is caused by infection of the ovine herpes virus type two. Ovine herpes virus type two's natural host is domestic sheep, and though domestic sheep carry the virus they do not express the disease (Heuschele and Reid, 2001; Gates et al., 2010). Testing has indicated that the virus is common in the United States in domestic goats (61%) and sheep (53%) (Li et al., 1996; Gates et al., 2010). Non-natural host animals that develop MCF are not considered contagious and may be dead-end hosts (Heuschele and Reid, 2001). MCF infection in bison is highly lethal, with almost 100% mortality within an infected herd (Schultheiss et al., 2001). Studies have shown that bison herds that are not associated with domestic sheep do not show evidence of MCF and there is no evidence that MCF is infectious in humans (Heuschele and Reid, 2001; Gates et al., 2010).

After initial infection, sheep experience periodic reactivation episodes in which they can transmit the virus (Heuschele and Reid, 2001). Inhalation of aerosol droplets and ingestion of food contaminated with the virus through feces, nasal secretions, and tears are the most common modes of transmission (Heuschele and Reid, 2001). Bison most commonly become infected through direct contact with domestic sheep, though there were cases where MCF was reported in bison herds that were located 3 miles from a lamb feedlot (Schultheiss et al., 2001; Gates et al., 2010).

It is possible to test for the presence of infection, though there is currently no vaccine or effective treatment for MCF (Heuschele and Reid, 2001). In order to reduce the spread of MCF from domestic livestock to bison, domestic bison should not be grazed in the same pastures or adjacent to sheep pastures, especially during lambing periods (Heuschele and Reid, 2001; Gates et al., 2010).

2.4 Bison Management

As with all game species a number of factors affect the management of bison as wildlife. Management would differ based on factors such as location, herd size, habitat quality, etc. It is crucial that any management plan allow for responsive and adaptive management strategies that are able to evolve with changing conditions.

2.4.1 Bison/Agriculture Interactions

Based on observations of bison and cattle in other regions, these two can coexist with minimal interaction. Observations of interactions between the two species have shown that they will sometimes graze within close proximity of one another (e.g. Van Vuren, 2001). There are no known reports of bison preventing cattle from utilizing vegetation or water sources nor are there reports of bison goring cattle or attempting to breed domestic cattle.

Since there is overlap between the forage consumed by bison and cattle, it is important to consider existing grazing practices within any discussion of restoring bison. Montana has a long-standing tradition of allowing private citizens to graze domestic livestock on public lands and this practice is important for the economic viability of individual ranchers and communities within the state. Though recognized as a privilege and not an inherent right, the continuation of the practice of private grazing on public lands is essential to many livestock ranches in Montana. The sale of cattle and calves was valued at $1.7 billion in Montana in the 2012 agricultural census (USDA, National Agricultural Statistics Service, 2012). Cattle are found throughout Montana and would need to be considered within the evaluation of any specific restoration site. Based on observations of bison and cattle in other regions, bison and cattle can coexist on the landscape and interaction appears to be minimal.

Other areas have managed bison in the presence of cattle for decades. Bison and cattle have coexisted within the same region of the Henry Mountains in Utah since the 1940s. The cattle there are managed with a traditional fencing system and yet the bison are able to move across the landscape. As the population of bison increased, so did tension with regional landowners and livestock producers. Efforts to mitigate these issues included the creation of the Henry Mountains Bison Committee. This committee, the BLM, Utah Division of Wildlife Resources, conservation organizations, regional livestock producers, and sporting groups have worked together to ensure that grazing continues to be shared by bison and cattle within the area. Over a million dollars has been spent on habitat and water improvement projects to improve resources for both bison and domestic cattle.

Ranchers have reported occasional observations of the wild Sturgeon River Plains Bison herd in the presence of cattle, but they have not had incidents of bison harassing the cattle,

and note that the two species appear to be pretty tolerant of each other. The potential for conflict between horses and bison is low based on experiences in the Yellowstone ecosystem but the potential for conflict does exist.

Bison can be restored while still maintaining domestic "livestock" bison herds. The presence of restoration bison on the landscape would not mean that domestic bison herds would have to be removed. Other states are able to maintain wild bison and domestic bison. There have not been reports from wildlife managers of conflict between wild bison and domestic bison. In Gardner a number of bison are kept in captivity in an area where YNP bison migrate. The wild bison do examine the captive bison, but there have not been issues of the wild bison damaging the fencing. It may be necessary to increase the fence height of the captive bison herds to prevent interaction. Montana already maintains a dual legal status for bison, wild or domestic, based on their ownership. The sale of domestic bison in 2012 was valued at $7.4 million from 66 bison operations.

Bison restoration could be considered in conflict with the agricultural crop industry of Montana. There were over 9.5 million acres of harvested cropland in 2012 in Montana with nearly $2 million of those acres irrigated. The market value of grains, oilseeds, dry beans, and dry peas was $1.7 billion (USDA, National Agricultural Statistics Service, 2012). Crop lands are found throughout Montana and would need to be considered within the evaluation of any specific restoration site.

2.4.2 Fencing

Most of the information pertaining to the effectiveness of fencing related to bison comes from those who are attempting to contain domestic bison and deter their natural instinct to move to better habitat. Fencing is viewed differently when it is recognized as a way to keep domestic livestock contained while allowing wildlife to move across the landscape. For example, if a fence is meant to contain a captive bison herd and the animals are able to jump the fence, then it is ineffective; however, if the purpose is to contain domestic livestock and allow restoration bison to move across the landscape by jumping the fence, then it is considered effective.

When evaluating a fence's ability to contain captive bison, it is important to consider the following factors, as they may enhance or hinder the effectiveness of fencing: 1) Whether or not a fence is constructed and maintained properly will have a large impact on its ability to contain bison; 2) The ability of the herd to access the proper quality and quantity of food and water is essential to maintaining them within fencing, as bison's motivation to breach the fence will increase if more adequate food or other resources are on the other side of the fence; 3) The density of bison can impact the effectiveness of fencing, with effectiveness decreasing as density increases; 4) The age and sex structure of the herd can impact the effectiveness of a fence, as a herd with more bull competition can lead to containment difficulties; 5) Snowpack and snowdrifts can also have an impact on the ability of a fence to contain bison (Gates et al, 2010; C. Knowles, Wildlife Biologist and Bison Rancher, pers. comm.). A final important factor in evaluating the effectiveness of fencing is determining the impact it may have on all other wildlife species in the area.

Bison managers and domestic bison producers prefer different types of fencing, and a variety of types appear to be effective in containing captive bison. Familiarity with electric fencing deters domestic bison from contact and properly constructed and maintained electrified fencing appears to be highly effective in containing captive bison herds (Lee, 1990; Butterfield Sr., 1990; Karhu, 2004; Quitmeyer et al., 2004; Dixon, Manager Snowcrest Ranch, pers. comm.). There is evidence that properly maintained three-wire, four-wire, and five-wire high-tensile electric fences are all effective for containing domestic bison (Lee, 1990; Butterfield Sr., 1990; Karhu, 2004; Quitmeyer et al., 2004; Paige, 2008; Dixon, Snowcrest Ranch, pers. comm.). If three-wire fencing is properly constructed and maintained, it should contain bison, yet be traversable by both adult and juvenile deer, elk, moose, and pronghorn antelope (Karhu, 2004; Quitmeyer et al., 2004; Paige, 2008). Four-wire fencing has not been proven to offer better control of bison, and it can be difficult for elk and moose to traverse (Karhu, 2004). The Snowcrest Ranch recommends a five-wire high-tensile electric fence, which is 48 inches in height with an 18-inch bottom wire (Dixon, Snowcrest Ranch, pers. comm.). However, FWP's *A Landowner's Guide to Wildlife Friendly Fences: How to Build Fence with Wildlife in Mind* (Paige, 2008) strongly cautions against fencing over 42 inches as it can have an adverse impact on other wildlife.

One of the main concerns with high-tensile wire is that it tends to stretch, and therefore does not readily break when an animal becomes entangled. While electric fencing does appear to be more effective than other types of fencing in containing bison, bison handlers have reported that when electric fences short out, bison quickly test the fences and may move through them (C. Knowles, wildlife biologist and bison rancher, pers. comm.).

Barbed wire fencing has also been used to contain domestic bison herds. Some landowners recommend five barbed wires with a height of about 5 feet 6 inches, though others note that a properly maintained three- or four-barbed wire fence will deter wild bison and/or contain domestic bison (Butterfield Sr., 1990; G. Vaadeland, pers. comm.). Barbed wire fencing can be highly problematic for wildlife species, especially if wires are loose or are spaced too closely (Paige, 2008). Many wildlife species, including native ungulates and birds, can become tangled in barbed wire fencing (Paige, 2008).

Woven wire fencing that is 48 inches high with two or three barbed wire strands at the top has also proven successful in containing captive bison (Butterfield Sr., 1990). Yet, woven wire creates a significant barrier for any wildlife species not able to jump or slip through, especially fawns or calves (Paige, 2008). Woven wire becomes a complete barrier when it is topped with barbed wire, especially for fawns, calves, pronghorn, and other animals that are unable to jump such a fence (Paige, 2008). Researchers at Utah State University completed a study of wildlife mortality along more than 600 miles of fence in the rangelands of northeastern Utah and northwestern Colorado and found that woven wire fence topped with a single strand of barbed wire was the most lethal type of fence (Harrington 2005, Harrington and Conover 2006).

2.4.3 Hunting

FWP utilizes hunting as a wildlife management tool, which in turn, generates public interest in the conservation of wildlife. The first Montana bison hunting program was authorized by the 1985 Montana Legislature, but was rescinded by the 1991 Montana Legislature due to negative public reaction to the way the hunt was conducted. In order to ensure all kills were quick and humane and so hunters could successfully harvest bison, all hunters were escorted by a game warden who guided them to the bison. This led to criticisms of "unfair chase" and "slaughter" (McMillion, 2009).

In 2005, the Montana bison hunting program was restored in order to cull bison that migrate from YNP, and increase the interest of the sportsman community in the species and its management. When the Montana legislature decided to bring back the bison hunting season, it stipulated that hunts had to be conducted under the rules of fair chase, i.e., hunters had to be on foot, and FWP officials could not tell hunters the specific location of bison (McMillion, 2009). The 2013 Montana Legislature passed HB 328, which removed the former provision that that FWP could not inform hunters of the physical location of wild bison. Under the revised statute, FWP may inform hunters of the general whereabouts of bison, as they do with other game species. The number of bison that exit the park varies from year to year, and therefore hunter success has varied from 1 to over 300 harvested in a year (Table 1). During the 2014-2015 harvest season, MFWP had over 9,513 applicants for 80 bison tags. Application fees for residents was $10 and $50 for non-residents. Either sex license fees were $125 for residents and $750 for non-residents. The total revenue generated from the applications and license sales totaled nearly $140,000 during the 2014 license year.

Hunters from the CSKT, the Shoshoni-Bannock, the Nez Perce, and the Umatilla tribes are able to hunt bison in regions of Montana based on the off-reservation, tribal treaty hunting rights reserved within their respective treaties. In the spring of 2013, the Crow tribe passed a resolution asserting their tribal treaty hunting rights. The tribe has not yet acted on this assertion. In addition to the five tribes listed above who are exercising their off-reservation hunting rights, Montana statute preserves the limited rights of the Assiniboine and Sioux, Blackfeet, Chippewa Cree, Gros Ventre and Assiniboine, Northern Cheyenne, and Little Shell Band of Chippewa (§ 87-2-731 MCA) to hunt bison.

Hunting is also used as a bison management tool in Alaska, Alberta, Arizona, British Columbia, South Dakota, Utah, and Wyoming. The number and types of licenses/permits that are issued, as well as the format of hunts within each region, changes based on the current bison population and management objectives. Licenses range from $50 to $5,400. Hunter success rates vary but range from 75% to over 90%.

Year	Applications	Successful Drawing Applicants	Bison Harvested (total or state/tribal hunter)
2004-05	8,373	10*	0*
2005-06	6,178	24	40/6
2006-07	6,210	74	31/26
2007-08	4,402	38	63/103
2008-09	3,079	36	1/0
2009-10	10,363	36	1/0
2010-11	7,754	34	22/172
2011-12	8,079	34	11/18
2012-13	7,834	34	37/213
2013-14	10,132	44	36/291
2014-15	9,513	72	42/172
*The current hunt did not begin until 2005. The successful 2004 applicants were given a 2005 license; therefore there were 34 licenses issued in 2005.			

Table 1. Number of applications and successful applicants for bison hunting tags in Montana. Data provided by N. Whitney, FWP. Harvest information provided by A. Jones, FWP.

In many locations, bison are a highly sought after hunting opportunity. Bison have adapted to hunting pressure in a manner similar to other big game species and can provide for a challenging hunting experience. Due to the limited number of 'wild' bison, many still hold the common misperception that bison are less wary than other wildlife and therefore, do not make for a challenging hunt. This is because most people are exposed to bison that are in domestic herds or in areas where hunting is prohibited, such as in a national park. Regions that maintain wild populations of hunted bison report that bison quickly become very wary of humans, resulting in a hunting experience similar to other big game species. Game managers in Utah report that hunting has resulted in bison with a strong tendency to flee at the sound of a stopping vehicle or the smell of approaching hikers. A biologist for the Kluane region of the Yukon, notes "hunting pressure is changing the behavior of these animals. They're moving away from places where people commonly saw bison the last few years in late winter and they're clearly avoiding people, going to places that are difficult to go to" (CBC News, 2001).

Managers use hunting as a tool to manage population size, distribution, increase landowner tolerance, develop public support, and monitor herd health. The Alaska Department of Game and Fish uses hunting as the main tool for managing the size and composition of the Delta Basin herd. Within Utah parts of the region where bison reside have significant physical barriers to bison movement, but it is probable that population management has had the greatest effect on the minimal dispersal observed. Public hunting of the Henry Mountains bison has been an essential part of the management program. Regional

managers adjust the annual number of permits in order to reduce or decrease the herd size based on regional conditions. The key is maintaining sportsmen access to bison. In Arizona bison have learned to move into Grand Canyon National Park to avoid sportsmen, which has led to an increase in the herd size.

The management plan for the Book Cliffs herd in Utah calls for public hunting to be the principle population management tool for both the tribal and public herds (Utah Division of Wildlife Resources, 2007a). The Ute tribe manages the population though the issuance of hunting permits, and has increased the number of permits in an attempt to reduce the size of the herd. The tribe is also exploring the potential to sell some of the bison to other programs or tribes to further control population growth (K. Corts, pers. comm.).

A public culling of corralled bison was used at one time to manage bison on the Raymond Ranch in Arizona (Bison Management Team, 2002). The practice was modified in 1972 in response to public demand for a fair chase hunt. The wildlife area manager now guides hunters to minimize herd disturbance and to help identify the target age and sex class (Bison Management Team, 2002; A. Zufelt, pers. comm.). The number of hunters is dependent on the current demographics and population objectives for the herd.

The plan established for bison in Grand Teton National Park and the National Elk Refuge allows for public hunting in attempts to maintain the herd within population objective (USDI, 2007). The plan also allows for the annual ceremonial taking of approximately five bison by Native American tribes associated with the region (USDI, 2007). The current attempt to reduce the number of bison through hunting, has been hindered by the fact that the bison tend to stay in Grand Teton National Park where they are safe from hunting. Wyoming Game and Fish has developed an 'on-again-off-again' hunting season to move bison off of the National Elk Refuge to national forest lands where hunters can access the animals.

2.4.4 Native American Hunting Rights

Many of the tribes who were native to Montana and surrounding regions entered into treaties with the U.S. government that preserved their right to continue to hunt on land outside of their respective reservations. Due to subsequent treaties and treaty disputes, many of these rights are still being assessed. Based on how the different treaties were written some of the tribes view the majority of Montana as aboriginal hunting land to which they have a right to hunt.

There is growing pressure from tribal interests, both inside and outside of Montana, to restore bison to public lands in order to honor tribal treaty rights. In 2012, the Montana Wyoming Tribal Leaders Council passed a resolution that called for the State of Montana to recognize the trust responsibility and treaty obligations to American Indian Nations in providing for viable populations of migratory buffalo in their native habitat. The resolution states that "for too long, politics has been used to trump Tribal Treaty Rights, cultural survival, Tribal sovereignty and trust responsibility" (MT WY Tribal Leaders Council, 2012, p. 1). The resolution notes, "by severely limiting wild buffalo abundance and distribution

on public trust lands, the state of Montana has abdicated its trust responsibility to ensure populations of indigenous species persist for future generations in perpetuity" (MT WY Tribal Leaders Council, 2012, p. 1). The resolution resolves that "the State of Montana should recognize that trust responsibility and Treaty obligations to American Indian Nations in providing for viable populations of migratory buffalo in their native habitat" (MT WY Tribal Leaders Council, 2012, p. 2).

The Montana Wyoming Tribal Leaders Council passed a second related resolution in March of 2013. This resolution continued to call for the State of Montana and Federal agencies to "recognize and honor it's trust responsibility and treaty obligations to American Indian Nations in providing for viable populations of migratory buffalo in the wildlife species' native habitat" (MT WY Tribal Leaders Council, 2013, p. 1). The resolution notes that "the American bison or buffalo is inseparable from the identities, traditions, cultures, beliefs, and religious practices of American Indians and an indigenous way of life" (MT WY Tribal Leaders Council, 2013, p. 1). It also notes that "the State of Montana's assertion of jurisdiction over migratory bison creates a reciprocal responsibility to legally consult and cooperate with American Indian Nations to preserve the wild species for future generations in perpetuity" (MT WY Tribal Leaders Council, 2013, p. 2). The resolution notes that "by severely limiting wild buffalo abundance and distribution on public trust and Treaty lands, the state of Montana and the U.S. Department of the Interior, Yellowstone National Park, U.S. Department of Agriculture, U.S Forest Service is violating its trust responsibility to ensure populations of indigenous species persist for future generations in perpetuity" (MT WY Tribal Leaders Council, 2013, p. 3).

The resolution resolves that "the state of Montana designate year-round habitat for migratory buffalo in collaboration with the U.S Forest Service and American Indian Nations so affected to further the land agency's goal of providing habitat for viable populations of all indigenous wildlife species and for increasing populations of big game animals" (MT WY Tribal Leaders Council, 2013, p. 4). It further resolves that "the state of Montana and the United States must recognize and honor it's trust responsibility and Treaty obligations to American Indian Nations in providing for viable populations of migratory buffalo in the wildlife species native habitat" (MT WY Tribal Leaders Council, 2013, p. 4).

2.4.5 Public Safety

Bison, similar to other large herbivores, including moose and elk, pose small, but manageable risks of personal injury (Nelson, 1965; Fortin and Andruskiw, 2003; Taylor and Knight, 2003; Gates et al., 2010). The level of risk is often dependent on the type of management program that is in place. The manner in which bison respond to humans depends on factors such as the level of habituation to humans, hunting pressure, and management practices. Bison that are habituated to humans often exhibit a mild-mannered domestic cow–like appearance. This is particularly true in national parks like Yellowstone, in which bison are protected. The differences between the behavior of animals inhabiting protected areas and those outside protected areas illustrates how human behavior can modify wildlife behavior. While many species typically avoid close contact with humans in non-protected areas, those same species may ignore nearby humans or be attracted to

humans in protected areas such as a park. Protected area wildlife that exhibit habituated or conditioned behavior toward humans often do so because human visitors exhibit habituated or conditioned behavior toward wildlife. (Zinn et al., 2008). The difference between the behavior of bison in areas with hunting programs and protected areas is a result of their experience with humans over time.

Bison programs in other places have only rare reports of human injury and the circumstances where injuries have been reported are typically unique. There is some personal safety risk for herd managers that are handling animals in confined situations or treating bison like domestic animals, however these risks have been minimal in other areas. Some risk to personal safety also exists for landowners, motorists or recreationists. As discussed in the hunting section (2.4.3), bison that are hunted often flee from vehicles or hikers.

2.4.6 Bison-Vehicle Collisions

Most drivers in Montana are aware of the potential for wildlife collisions due to the large variety of wildlife and domestic livestock that may be present on roadways. The Montana Department of Transportation marks regions of increased potential for wildlife collisions with warning signs along roadways. Data on the potential for bison-vehicle collisions and frequency of bison encountered on roadways is limited due to the lack of wild herds in the United States. Many mitigations such as wildlife underpasses, fencing, and signs are already in place through the cooperative work of agencies, nongovernmental organizations, and citizens to reduce conflicts of wildlife on roadways around the state. As with all wildlife, there is the potential that bison may enter roadways.

The primary regions of Montana where wild bison are found and where there have been reports of bison-vehicle collisions are the areas north and west of YNP. The highways near West Yellowstone transect highly used bison habitats and cut directly through the bison's winter migratory path creating a high level of bison cross-traffic. Based on Montana Department of Transportation's data on crashes involving bison, the average number of bison collisions on US 191 between 1999 and 2009 was approximately 1.7 per year. The majority of these crashes occurred in the evening or early morning hours. In 2010, there was one collision that occurred with a domestic bison. During the following four years, the number of bison-vehicle incidents was five, three, zero, and two respectively. In comparison, the number of incidents in the Gardiner Basin along US Highway 89 for 2011-2014 was two, zero, zero, and two respectively. All of the 2013 and 2014 incidents resulted in property damage but no human injury.

With more than three million annual visitors to Yellowstone National Park, most arriving during the concentrated summer vacation season and using limited roadways, there is a large potential for collisions with wildlife. The park compiles data on the number of bison killed on roadways based on reported carcasses. The number of bison killed between 2000 and 2009 from vehicle collisions varied yearly from a high of 28 bison killed in 2002 to 9 bison in both 2000 and 2008, with an annual average of 16 bison killed between 2000 and 2009. During 2010, there were 28 reports of bison-vehicle collisions with no human

injuries. In 2011 there were 22 reported bison-vehicle collisions with three human injuries. In 2012, there were 13 bison killed by vehicle collisions. For comparison, there were 642 total reported motor vehicle accidents in the park during 2010 and 549 reported in 2011.

Park personnel feel that excessive vehicle speed increases the risk of collisions with bison, as does the time of day. The YNP Division of Law Enforcement notes that there have been no reported human fatalities from accidents involving bison within the park, based on accident reports from 2008 to 2012.

The British Columbia Conservation Foundation's Wildlife Collision Prevention Program (WCPP) examines bison-vehicle collisions with Wood Bison. The WCPP identifies some of the reasons why Wood Bison use roadways in northwestern Canada. A few of the reasons the animals are attracted to the roadways that were noted include: 1) plowed roads can provide easier travel routes than forested locations, especially during deep snow; 2) highways and right of ways are often windy, which relieves some irritation from biting insects; 3) vegetation along the side of the road is accessible throughout the year; and 4) the disturbed sites on roads provide good establishment of palatable vegetation (British Columbia Conservation Foundation, 2010). The WCPP indicates that traffic factors influencing the number of bison-vehicle collisions include increased traffic volume, an increased number of industrial vehicles, and long straight stretches that allow drivers to travel at speeds well over the posted limits (British Columbia Conservation Foundation, 2010). The WCPP program recommends the enforced reduction of speed limits, especially during the evening, as an effective way to reduce bison-vehicle collisions.

The factors that contribute to bison-vehicle collisions include: 1) the fact that bison are a herd animal; 2) the lowered position in which bison typically hold their head reduces the reflectivity of their eyes, thereby decreasing visibility at night; and 3) bison have different reactions based on their perception of a threat. Seasonal factors such as the rut or the presence of calves may alter the potential of bison-vehicle collisions (British Columbia Conservation Foundation, 2010). The WCPP has found that low and changing light at dawn, dusk, and night can increase the risk of bison-vehicle collisions for a number of reasons including the fact that bison may be more active during periods of low light; that bison have dark coats; and that during periods of snowfall the snow can accumulate on the backs of bison, reducing the contrast between the bison and the ground (British Columbia Conservation Foundation, 2010).

Another important factor in the probability of bison-vehicle collisions is based on whether the roadway transects highly used habitat, as it does outside of West Yellowstone. A report compiled by the Western Transportation Institute noted, US 191 directly cuts through the bison migratory pathway outside of West Yellowstone creating a high level of bison cross-traffic (Dupree and DiMambro, 2010).

The WCPP recommends a number of ways that drivers can reduce the risk of bison-vehicle collisions. These practices include paying attention to road signs indicating the potential presence of bison, maintaining the posted speed, reducing speed at night, remaining more

vigilant, and practicing defensive driving while traveling through regions where bison have been observed.

2.5 Legal Classifications of Bison

The state of Montana's legal classification of bison is based on whether they are found on commercial farms, in private conservation herds, or in the wild. The two classifications given to bison in Montana are "domestic livestock" or "game animal" although bison are often referred to as wildlife or simply wild bison. Bison that are wild and held in the public trust are classified as a game species in Montana. "Game animal means deer, elk, moose, antelope, caribou, mountain sheep, mountain goat, mountain lion, bear, and wild buffalo" (§87-2-101(6) MCA). "Wild buffalo' means buffalo or bison that have not been reduced to captivity" (§87-2-101(16)MCA). FWP is charged with supervising "all the wildlife, fish, game and non-game birds, waterfowl, and the game and fur-bearing animals of the state . . ." (§87-1-201 MCA). In addition, FWP "shall enforce all the laws of the state regarding the protection, preservation, management, and propagation of fish, game, fur-bearing animals, and game and non-game birds within the state" (§87-1-201(2) MCA). Domestic livestock may include bison that have been reduced to captivity and are privately owned under the authority of MDOL under the laws at Title 81.

In 1995, concern over the potential for the spread of disease from wild bison to domestic cattle led to the enactment of a statute that further classified wild bison as a species in need of management under the authority of FWP and as a species in need of disease control under the authority of MDOL (see §87-1-216 MCA). The statute designates "publicly owned wild buffalo or bison originating from Yellowstone National Park as a species requiring disease control" and "designated other wild buffalo or bison as a species in need of management." Currently all wild bison within Montana originate from YNP; therefore management authority for wild bison is shared between FWP and MDOL.

Statute §87-1-216 MCA gives FWP responsibility for the management, "including but not limited to public hunting, of wild buffalo or bison in this state that have not been exposed to or infected with a dangerous or contagious disease but may threaten persons or property". The section further requires FWP to consult and coordinate with MDOL in implementing these management programs "to the extent necessary to ensure that wild buffalo or bison remain disease-free" (§87-1-216 MCA). It also gives FWP the authority to "adopt rules with regard to wild buffalo or bison that have not been exposed to or infected with a contagious disease but are in need of management because of potential damage to persons or property" ((§87-1-216 MCA). The statute was amended in 2011 to require that FWP develop a management plan "before wild buffalo or bison may be released or transplanted onto private or public land" (§87-1-216 MCA). This amendment also requires that "animal containment measures that ensure that any animal transplanted or released on private or public land will be contained in designated areas".

The management of wild bison for disease control gives MDOL the authority to take certain action (§81-2-120(1) MCA). Whenever a publicly owned wild buffalo or bison from a herd that is infected with a dangerous disease enters the state of Montana on public or private

land and the disease may spread to persons or livestock or whenever the presence of wild buffalo or bison may jeopardize Montana's compliance with other state-administered or federally administered livestock disease control programs MDOL may physically remove the live bison by the "safest and most expeditious means from within the state boundaries, including but not limited to hazing and aversion tactics or capture, transportation, quarantine, or delivery to a department-approved slaughterhouse"; the live bison may be "destroyed by the use of firearms"; the live bison "may be taken through limited public hunts when authorized by the state veterinarian and the department"; or the live bison "may be captured, tested, quarantined, and vaccinated" (§81-2-120 (1)(a)–(1)(d)MCA). If MDOL implements the capture, test, quarantine, and vaccinate method, it may certify the wild bison as brucellosis free and then sell or transfer the bison to qualified tribal entities in a "manner that does not jeopardize compliance with a state-administered or federally administered livestock disease control program" (§81-2-120(1)(d)(ii)MCA). "The department (MDOL) may adopt rules consistent with this section governing tribal participation in the program or enter into cooperative agreements with tribal organizations for the purpose of carrying out the disease control program" (§81-2-120(1)(d)(ii) MCA).

Additional Montana Statutes that Pertain to Bison

Public hunting is used as a management tool by FWP to manage the populations of game species and is just one of the tools allowed in the management of bison as a species in need of disease control (§87-2-730 MCA). While FWP has been the agency that regulates hunting, a 2003 statute created a special wild buffalo license whereby "the public hunting of wild buffalo or bison that have been designated as a species in need of disease control is permitted only when authorized by the department of livestock" (§87-2-730(1) MCA). This statute required that FWP adopt rules in cooperation with MDOL and the state veterinarian for the implementation of bison hunts. The hunt must be a "fair chase" hunt, which requires that "hunting be conducted on foot and away from public roads and that there be no designation of specific wild buffalo or bison to be hunted" (§87-2-730(3)(d) MCA).

A person convicted of illegally "taking, killing, possessing, or transporting" wild buffalo "or any part of these animals shall be fined an amount of not less than $500 or more than $2,000, be imprisoned in the county detention center for not more than six months, or both" (§87-1-102(2)(a) MCA). Additionally that individual "shall forfeit any current hunting, fishing, recreational use, or trapping license issued by this state and the privilege to hunt, fish, or trap in this state for 30 months from the date of conviction or forfeiture unless the court imposes a longer forfeiture period" (§87-1-102(2)(a) MCA). The penalties increase if the individual is convicted of repeated offenses.

At the same time as the 1995 reclassification of wild bison as a species in need of management and a species in need of disease control, a statute was adopted that allows a private property owner to kill a wild bison that is "suspected of carrying disease and that is present on the landowner's private property and is potentially associating with or otherwise threatening the landowner's livestock" (§81-2-121(1)(a) MCA). The landowner must first notify or attempt to notify MDOL "in order to allow as much time as reasonable for the department to first take or remove the publicly owned wild buffalo or bison that is

on the landowner's property" (§81-2-121 MCA). The landowner must also "make a good faith effort to notify the department that a taking has occurred and to retain all parts for disposal by the department" (§81-2-121 MCA). The landowner must not "intentionally provide supplemental feed to game animals in a manner that results in artificial concentration of game animals that may potentially contribute to the transmission of disease" (§81-2-121 MCA). If a person is found guilty of providing supplemental feed to game animals as outlined above, they are "guilty of a misdemeanor" and are subject to additional penalties (§81-2-121 MCA).

An act was passed in 2011 that granted MDOL the authority to establish a permit and inspection system for the transportation of domestic bison into and out of counties and into and out of the state for the purposes of tracking animal movements and collecting per capita assessments (§81-1-101 MCA).

2.6 Tribal and Privately Owned Bison in Montana

2.6.1 Tribal Involvement in Bison

In order to facilitate and coordinate the return of bison to tribal reservations, the InterTribal Bison Cooperative, which is now InterTribal Buffalo Council (ITBC), was formed in 1990 (ITBC, 2011). The goal of ITBC is "re-establishing buffalo herds on Indians lands in a manner that promotes cultural enhancement, spiritual revitalization, ecological restoration, and economic development" (ITBC, 2011). As of 2011, ITBC has a membership of 57 tribes and maintains a collective herd of over 15,000 bison (ITBC, 2011). The manner in which the individual herds are managed varies. Some tribes maintain their bison with limited management, while others have more strictly managed herds.

Tribal herds are managed on six of the seven Native American reservations in Montana. As of 2010, there were approximately 2,340 tribal herd bison, including the 400 bison on the NBR, which is co-managed by the CSKT of the Flathead Reservation and the USFWS. The majority of the tribes have expressed interest in expanding their herds if feasible, and many offer limited bison hunting opportunities. Some of the tribes are also in the process of exploring the potential to create separate cultural herds, which would be managed for different purposes and values than commercial herds.

There was a tribal herd on the Flathead Reservation separate from the NBR herd in the past and there is the possibility that one may be reestablished in the future. There are three known larger private herds on the reservation, which vary between 200 and 300 head of bison. In addition, many individuals on the reservation occasionally have a few domestic bison.

The largest of the tribal herds is on the Crow Reservation. As of 2014, the tribal herd has 1,600-1,800 bison and is managed within natural barriers on approximately 30,000 acres, with additional access to 120,000 acres in the mountains. There are plans to expand the herd, as a result of an increase in available acreage. Hunting tags are occasionally issued to the general public as a population management tool. There are no additional privately owned herds remaining on the reservation.

Adjacent to the Crow Reservation is the Northern Cheyenne Reservation. As of 2014, the Northern Cheyenne tribe maintained a tribal herd of approximately 150 head of bison, with plans to expand in the future. Although there is a pasture for the bison, it is small, and the herd tends to be free-roaming on the reservation. Special tags are occasionally issued to tribal members for hunting. There are no additional privately owned herds on the reservation.

As of 2014, the Assiniboine and Sioux (Nakota, Lakota, and Dakota) tribes of the Fort Peck Reservation managed a tribal herd that consisted of approximately 120 bison (post hunting season), which are contained on approximately 9,000 acres. There is a hunting program that is open to tribal and non-tribal members. Bison from the Quarantine Feasibility Study (QFS) have been transferred to the Tribe and as of late 2014 there were 183 bison in this herd. These bison are managed for cultural purposes and separate from the tribe's commercial herd. There are two additional privately owned herds on the reservation, one with approximately 100 bison, and the second with around 50 bison.

The Gros Ventre and Assiniboine tribes of the Fort Belknap Reservation manage a herd of around 600 bison in an enclosure that is approximately 22,000 acres as of June 2014. There are some limited hunting opportunities available to tribal members and the general public, mainly to cull older bulls. For the 2010-2011 season five tags were issued at a price of $2,000 each for a four- to six-year-old bull, and approximately five tags were issued at a cost of $3,000 each for a seven-year-old or older trophy bull. Thirty two of the QFS bison that were initially transferred to Fort Peck were transferred to Fort Belknap, where they are managed separately from the commercial herd. This herd had grown to 43 bison as of late 2014. There are no additional privately owned herds on the Fort Belknap Reservation.

The Blackfeet tribe manages a herd that consists of 120 mature bison and 30 calves as of June 2013. The bison are managed on 1,400 acres in the summer and moved to a 9,000-acre ranch in the winter. The tribe hopes to expand the herd in the future, and currently sells a limited number of hunting tags. There are two privately owned herds on the reservation. The first is made up of about 10 bison, and the second is a newly established production herd of approximately 600 bison.

2.6.2 Private Herds

Bison can be kept as livestock throughout the United States, and today domestic bison in private herds account for over 93% of the bison in North America (Gates et al., 2010). Gates et al. (2010) estimates that within the United States and Canada there are 400,000 privately owned bison on approximately 6,400 farms. Private herds, in which bison are managed as livestock, account for the majority of bison in Montana. The National Bison Association reported in 2012 that Montana had 80 bison farms with 14,671 bison. According to the February 2013 Department of Revenue per capita head count, there were 9,995 reported bison over the age of nine months in Montana, which generated $54,972 in per capita fees for Montana (S. Merritt, MDOL, pers. comm.).

While the efforts of early bison ranchers may have been to conserve the Plains Bison, modern bison ranching is now driven primarily by commercial interests. The management of bison as livestock has led to cattle gene introgression and the domestication of private herds. As Isenberg (2000) notes, domestication is not confinement or habituation to humans, but is instead "selective breeding: humans deciding which individuals will produce the next generation, and choosing them to produce a next generation that will better serve human goals" (p. 198). In order to create more manageable and profitable bison herds, private ranchers selectively breed for desired traits. Ranchers selectively breed for traits that include docility, growth performance, conformation, and reduced agility (Isenberg, 2000; Gates et al., 2010). The artificial selection of preferred traits alters the natural genetic variation of the herd. The large number of domesticated bison, which are found throughout the United States, may reduce the public's perception of the need for bison conservation (Freese et al., 2007), yet domesticated bison have been altered morphologically, physiologically, and behaviorally.

2.7 Social Value of Bison

The symbolic value that bison hold is important to some in Montana, however bison restoration is complicated by the concerns of agricultural and private landowner interests. There are concerns that bison restoration could impact current land uses or that bison could transmit diseases to livestock. There is also the concern that bison could have negative economic impacts or reduce public access to some lands. However, bison restoration also presents opportunities for restoring some of the ecological role bison once played on the prairie, as well as for increasing tourism and hunting opportunities.

2.7.1 Social Value/Perception of Bison Restoration in Montana

The restoration of a bison herd somewhere in Montana could contribute to the wildlife legacy that many Montanans have taken pride in for generations. Montana has worked for decades to restore nearly all the big game and carnivore species, to include mountain goats, elk, wolves and grizzly bears. Bison restoration has been ignored in large part due to the complicated situation around Yellowstone National Park and disease transmission concerns of the livestock industry. Montana statute does call for the conservation and restoration of native species across the state.

In 2014, the Montana Wildlife Federation passed a resolution in support of bison restoration in Montana to include specifying a restoration herd goal of 1,000 animals. The Montana Chapter of The Wildlife Society signed a position statement in 2000 in support of maintaining 'wild' bison and establishing additional herds in Montana where it is ecologically, economically, and socially acceptable.

A public survey commissioned by the National Wildlife Federation (NWF) and Wildlife Conservation Society in 2012 found 68% of the 400 likely voters surveyed support bison restoration in Montana. The survey was conducted in June of 2012 by Public Opinion Strategies, a national market research company and had a margin error of (+ or -) 4.9%. The survey found support for bison restoration remains consistent in response to general and specific questions on the issue. Sixty-nine percent of respondents voiced support for

building a new herd of wild bison on public land in and around the 1.1 million acre Charles M. Russell National Wildlife Refuge (CMR). This survey closely tracks a similar poll conducted by Moore Information, Inc. in February of 2011 that found 70% of Montanans support bison restoration.

The NWF has two specific campaigns underway to restore bison to the CMR and the tribal lands of northeast Montana. According to the NWF, this work presents a unique partnership opportunity to unite sportsmen, conservationists, and state and federal wildlife agencies to return an iconic species to their native habitat. In 1997, the NWF signed a memorandum of understanding with the Intertribal Bison Cooperative to advocate for the return of wild bison to Tribal lands. In 2014, NWF was signatory to a letter in support of FWP restoring bison in Montana along with the following organizations; Montana Wildlife Federation, Hellgate Hunters and Anglers, Gallatin Wildlife Association, Anaconda Sportsmen, Laurel Rod and Gun Club, Helena Hunters and Anglers. Later in 2014, nearly 40 scientists submitted a letter to Montana Governor Bullock supporting bison restoration. There are many other examples of organizations that have publicly proclaimed their support of bison restoration as evidenced by position statements found on their web pages or brochures. Editorials regarding bison restoration are common and include those generally in support of bison restoration somewhere in the state, and others more specific to potential sites in Montana.

Another public survey commissioned by Defenders of Wildlife that polled 500 Montana voters was published in January 2015, showing 76% of those surveyed supported FWP 'restoring wild bison on some of Montana's public lands.' Seventy-eight percent supported 'efforts of tribes to restore wild bison populations on tribal lands' and 67% supported 'efforts to relocate disease-free bison from Yellowstone to start new herds in other parts of Montana.'

In 2014, the Department of Interior (DOI) released a report entitled "Looking Forward" prepared by the DOI Bison Leadership Team and Working Group. The report is an evaluation of existing DOI bison resources crucial to the long-term conservation of the species, and a look at lands that could accommodate the establishment of bison herds in the future. CMR lands are mentioned as DOI property that could be suitable for bison restoration but the report points out that formal planning efforts must be led by the state of Montana.

At the same time these polls, letters and reports have shown *support* for bison restoration, other polls, letters and reports have been submitted to FWP and the Governor's office in *opposition* to bison restoration. There have been locally organized petitions generally against bison restoration or petitions suggesting where bison should be translocated within Montana. One recent such petition hosted on 'change.org' in 2014 supported bison restoration on tribal lands only.

A number of polls or petitions have shown support for restoration of bison on tribal lands. One hundred fifty-five people signed a petition organized by a Hinsdale, MT resident in 2014 supporting full tribal ownership of quarantine bison by the Fort Peck and Fort

Belknap Indian reservations. A recent survey of residents within the Montana area of the Iinnii Initiative (Blackfeet Reservation) showed 74% of survey participants strongly agreed that bison are especially important to Blackfeet people and are an important symbol of Blackfeet history and culture. Seventy percent strongly supported the Blackfeet tribe partnering with neighboring federal, state or provincial land managers to create more bison habitat. Fifty-seven percent strongly supported restoring bison populations somewhere in Blackfeet Country.

A number of recent local government actions to garner more control over wildlife management or management of specific lands further reflect concerns over bison restoration. Some county commissions in Montana have passed ordinances stating all bison within the county are to be classified and managed as livestock. Other counties have passed zoning laws that deem all bison within the county "livestock", restricted to zoned agricultural lands. Still others have passed ordinances to prevent any bison translocation into their counties by FWP or the USFWS without prior county commission approval. Legislation in 2011 and 2013 proposed to do this same thing but both bills were vetoed by the Governor.

The Montana Association of Counties (MACo) passed policies relative to bison to include the following: 1) MACo supports the designation of bison introduced into areas of the state not currently populated by bison as domestic livestock to be managed by the Montana Department of Livestock, and 2) MACo supports requiring regulation of bison by the Montana Department of Livestock to cross county lines. A grazing policy of MACo deals with use of the CMR specifically; the policy "supports livestock grazing on the CMR at levels that sustain economically sound livestock operations and maintains the ecological health of the resource" (2014 MACo Policy Booklet).

The Montana Association of Conservation Districts (MACD) passed Resolution 13-03 in November, 2013 that states the "Montana Association of Conservation Districts stands opposed to free roaming wild buffalo or bison." The resolution further resolves the MACD to: 1) amend Montana Law to prohibit the establishment of any free roaming wild buffalo or bison within the state of Montana; 2) amend Montana Law to clearly define that any bison or buffalo that has been captive, corralled, fenced in, or transported is no longer considered free roaming and/or wild; 3) amend Montana Law to clearly state that bison or buffalo that are not kept in the confines of those wishing to house them will be defined as domestic livestock and subject to Montana laws.

A number of agricultural organizations have publicly opposed any idea of 'free-roaming' bison and numerous anti-bison editorials, have been published in local newspapers by organizations or individuals since the 2012 public scoping meetings. There are many other examples of organizations that have publicly proclaimed opposition bison restoration as evidenced by position statements found on their web pages or brochures.

Rough estimates from the FWP Block Management Access program indicate six landowners (10% of all landowners who dropped out) in 2012 and 14 landowners (21% of all who dropped out) in 2013 claimed to have dropped out due to concerns over FWPs

management of bison. In many of these cases, bison were just one of the reasons cited for dropping out of the program.

2.7.2 Tribal Cultural Values of Bison

Though widely absent from the plains, wild bison still hold an important place in the cultures and spiritual lives of many modern native tribes. In addition to the cultural and spiritual importance of bison there is also an initiative to improve tribal health by returning to the traditional diet of bison meat. Many native tribes have restored domestic bison herds for meat production. There has also been pressure from many tribes for Montana or the federal government to restore wild bison in order to honor tribal treaty hunting rights. Many of the tribes who were native to Montana and surrounding regions entered into treaties with the U.S. government that preserved their right to continue to hunt bison outside of their respective reservations.

Efforts of the Montana Wyoming Tribal Leaders Council and Inter Tribal Buffalo Council to restore bison across the range of the bison highlight Native American interest in bison for cultural and historical purposes (see sections 2.4.4 and 2.6.1 of this document for more information).

In Montana the tribes of the Blackfeet, Fort Peck, Fort Belknap, Crow, and Northern Cheyenne Reservations have brought bison back to native lands as livestock. The Iinnii Initiative of the Blackfoot Confederacy is one example of a large, landscape restoration effort to bring bison back to fill their ecological niche and the historical cultural role for native peoples. The goal of the Initiative is to restore bison which are central to the historical, cultural and ecological legacy of the region, conveying multiple benefits to the Blackfeet and providing native peoples the opportunity to reconnect with a living symbol of their ancient culture. The Iinnii Initiative also seeks to connect restoration efforts to the economic sustainability of communities.

2.7.3 Recreation Values

The presence of publicly managed bison has the potential to bring increased tourism and hunting dollars to local economies. In a situation that would allow for fair chase hunting, the presence of bison has the potential to create new and unique hunting opportunities for Montana's sportsmen and women. Recreation and hunting outfitters are permitted on specific National Forests, hunting districts, or locations and could be impacted by a potential restoration program. Bison presence on a landscape could offer additional opportunities or complicate activities historically pursued in an area if use regulations were altered due to bison presence.

MFWP utilizes hunting as a wildlife management tool, which in turn, generates public interest in the conservation of wildlife. Public access would be required for public hunting and wildlife viewing in any restoration program. Any hunting or viewing program would have to be agreed upon by working group, MFWP and landowner(s) to include clarification of financial incentives (or not) for allowing public access. Bison have been hunted and

viewed in Montana when they migrate out of Yellowstone National Park since 2005. Tribes harvested 172 bison during the 2014-2015 season while state hunters harvested 42 bison.

Region	Type of Tag	Resident Fee	Nonresident Fee	Estimated Annual Revenue to Management Agency
Alaska	General Bison Tag	$25	$450 nonresident	$350,000
			$650 alien nonresident	
Arizona	Bull	$1,113	$5,415	$230,000 (high permit year – 2014) $74,000 (low permit year - 2013)
	Cow or Yearling	$663	$3,265	
	Yearling	$363	$1,765	
Alberta	General Bison Tag	$50	NA	$40,000
British Columbia	Trophy Bull	$70	$700	$80,000
South Dakota	Non-Trophy Bull	$2,256	$2,256	$50,000
	Cow	$1,756	$1,756	
Utah- Henry Mountains	General Bison Tag	$413	$1,518	$130,000
Utah- Antelope Island	General Bison Tag	$1,110	$2,615	$35,000
Wyoming	Cow/Calf	$252	$1,002	$205,000
Montana	Either sex	$125	$750	$139,000

Table 2. The cost of bison tags/permits by area for the 2014 season as well as the estimated annual revenue brought in by the sale of tags.

Around 230,000 hunters take advantage of hunting opportunities in the state and contribute tens of millions of dollars in license fees that help fund MFWP. Bison hunting or the presence of bison could negatively impact other hunting opportunities to include big game, upland game bird, and waterfowl hunting if the presence of bison within an area was a deterrent to hunters in pursuit of other species.

Outfitters in Montana offer clients a variety of recreational opportunities throughout the state including guided services for hunting, fishing, trail rides, mountain biking, and cross-country skiing. Outfitters are permitted on specific National Forests, hunting districts, or locations. Outfitters could be impacted by a potential restoration program, along with other outdoor recreationists. Bison presence on a landscape could offer additional opportunities for guiding hunters and wildlife viewers, but could also complicate activities historically pursued in an area if use regulations were altered due to bison presence.

About 50% of surveyed resident and non-resident visitors to YNP indicated that seeing bison was a reason for their trip, and about 5% said they would not have come to the area if bison had not been present (Duffield et al. 2000a,b). Regions around Yellowstone and

Glacier National Parks receive large amounts of tourism revenue due to the millions of annual visitors to the national parks that also visit the surrounding states.

Montana has hosted roughly 10 million visits from non-residents each year since 2005 (Grau, 2013). The combined spending of 2011-2012 resident and nonresident travel within the state was $3.6 billion in local spending, which supports $2.9 billion of economic activity in the state, and supports an additional $1.6 billion of economic activity, indirectly (Grau, 2013). Bison restoration could be a way to increase tourism revenue in additional areas of the state assuming public viewing access was established and promoted as part of the restoration effort.

The National Bison Range complex receives an average of 125,000 annual visitors (USFWS, 2014). Visitors come from all over the Nation and the world to learn about and enjoy a variety of wildlife dependent on the complex that includes the National Bison Range property, Ninepipe National Wildlife Refuge, Pablo National Wildlife Refuge, and the Northwest Montana Wetland Management District. In 2012, approximately 203,500 resident and nonresident visitors viewed and photographed wildlife, hunted, fished, and participated in events and programs. Fifty thousand visitors came for wildlife photography opportunities and 40,000 visitors came specifically to the National Bison Range Visitor Center (USFWS, 2014). The most popular activity for visitors is driving the 19-mile Red Sleep Mountain Drive on the Bison Range. This route offers spectacular scenery and opportunities to view and photograph wildlife.

2.8 Costs of Bison Management

(More information on program costs are provided within the case studies of Chapter 4 and Section 4.4.7)

FWP expenses for bison-related management activities, which could include hazing, response to landowner calls and public safety incidences, and assistance for other partners could be included under the existing budgets for regional wildlife management, enforcement duties, and general administration. However, additional costs for these activities could be unsustainable. Depending upon the alternative chosen, costs to FWP or other agencies could be zero or substantial. It is difficult to define possible additional costs because it is unknown at what level management would be required.

Fully confined herds can be the most costly to manage. The USFWS National Bison Range 2011 operating budget was approximately $2,095,000 for wildlife management, site maintenance, visitor services, law enforcement, and personnel costs. Within Custer State Park bison are managed alongside other species so while there is not a separate bison management budget some costs are directly bison related and are estimated to be around $60,000 annually. The Raymond Ranch in Arizona has an annual operating budget of approximately $100,000.

The confined herd programs that were examined in FWP's Interim Translocation of Bison EA (2011) showed start up costs for fencing, gates, handling facilities, equipment, water

infrastructure, and personnel to range from $840,000 to over $1 million depending upon the translocation site and the existing facilities there. The estimated annual costs for personnel, fencing, facility maintenance, etc. could be around $140,000 annually to manage a herd of approximately 40 bison (Interim Translocation of Bison EA, 2011).

The Buffalo Expansion Feasibility Study from Oglala Sioux Parks and Recreation Authority identified four alternatives given the landscape, its boundaries, and the desire to create a wild, free-roaming herd. The alternatives show size of the area, herd goals and required fencing estimated to cost $15,000/mile. The different alternatives have different landscape and geography challenges which influence the amount of fencing needed and the number of bison suitable for restoration. They estimated cost of corrals large enough to handle the buffalo herd and meet National Park Service specifications is $500,000. All alternatives could be expected to employ at least one GS-5 through GS-7 Full Time Equivalent (FTE) at current rates of $31,000 to $39,000 (Licht, 2014).

The Canadian government has committed 6.4 million dollars over a five year period to fund a bison restoration program of 600-1,000 bison in Banff National Park. The herd size is based on the estimated number of bison that could be supported on 25% of the available winter forage in the park. While containing bison within the park through fencing is a fundamental requirement for the project, fencing must be used in such a way as to avoid degrading habitat and population connectivity for other wildlife in the park. A combination of fencing and natural topographic barriers will be used to discourage bison from moving onto provincial lands, transportation corridors or other areas in the park. Parks Canada will undertake intensive on-the-ground efforts to evaluate and adapt the fencing to ensure it is permeable for other wildlife. This will involve using pre-existing baseline information on wildlife movement in the park and conducting fence permeability monitoring before and throughout the bison reintroduction. All bison released will have numbered ear tags, and a subset of the herd will be fitted with satellite-linked GPS collars. Their location, patterns of habitat use, and survival will be monitored remotely via satellite and by regular direct observation of the herd. Intense monitoring efforts as described add greatly to the overall project costs but can be conducted with local employees.

Chapter 3: Alternatives

3.1 Introduction

This chapter describes four alternatives and outlines how each alternative addresses issues identified by the public during scoping. The alternatives include:

- Alternative # 1: No Action
- Alternative #2: Restoration of a Publicly Managed Bison Herd on the Private and/or Public Lands of Willing Landowner(s)
- Alternative #3: Restoration of a Publicly Managed Bison Herd on Tribal Lands
- Alternative #4: Restoration of a Publicly Managed Bison Herd on a Large Landscape Where there are Minimal Conflicts with Livestock

These alternatives were suggested and roughly developed by the Bison Discussion group, a mix of stakeholders that formed in 2013. FWP retained the ability to reject or accept alternatives suggested by this group and added the majority of detail to these alternatives following the final meeting of the group in October 2014.

At least one 'case study' has been included for each of the alternatives that considers restoration to illustrate a real life scenario that fits the general criteria of the alternative. The case studies do not represent the only scenarios that could fit within the criteria of the alternative but do represent scenarios to assist in evaluating the feasibility of each alternative. Case studies include general evaluation of economic, social, political and biological impacts of a real bison restoration effort.

Implementation of any alternative at any specific site would require completion of an Environmental Analysis to evaluate all factors and potential impacts of the action in detail. Sites that might fit within the sideboards of a selected alternative would be solicited by FWP if and when implementation of any alternative to restore bison is determined feasible and desirable.

3.2 Alternative # 1: No Action

Implementation would involve FWP completing this EIS process and signing a Record of Decision indicating that it will not take any further action. Implementation would require the least amount of resources in the short term compared to other alternatives but would not resolve pressure to restore bison on the Montana landscape. This alternative could be selected if the present situation is acceptable to decision makers. Yellowstone bison would continue to be managed under the Interagency Bison Management Plan. Selection of the 'no action' alternative now would not preclude action at a later date.

3.3 Alternatives #2-#4: General Guidelines

Alternatives #2-4 as described in later sections, allow for bison restoration in some form. The following guidelines would apply to any restoration program and would guide completion of an Environmental Assessment (EA) of a specific restoration site and corresponding management plan. Other specifics to be evaluated in a site/program specific EA include but are not limited to: 1) historical use of the site, 2) current number, use and

availability of AUMs on site, 3) current uses of the site, 4) potential for interactions with recreational users, 5) ESA listed species considerations, 6) tribal versus nontribal hunting opportunity, 7) current hunting pressure, 8) proximity of private domestic bison herds, 9) specific natural resource development concerns or potential conflicts, 10) ungulate winter range use, 11) history of vehicle collisions with other wildlife species at the site, 12) any wilderness designations, 13) any federal land use initiatives, 14) political and social concerns specific to the site, 15) private residences such as seasonal cabins on the site, and 16) archeological sites.

3.3.1 Bison Restoration Project Guidelines

Project Site Guidelines

Site: Any restoration sites would have defined geographic boundaries. The site containment plan would be developed to match these boundaries and could include different levels of management responses depending on the different levels of social tolerance. (Herd containment is discussed below within the Herd Management.)

Landownership: FWP would respect private property rights. Like management of other species, FWP would work closely with landowners to reduce conflicts. Some counties in Montana have passed ordinances stating all bison within the county are to be classified and managed as livestock. Other counties have passed zoning laws that deem all bison within the county 'livestock', restricted to zoned agricultural lands. Still others have passed ordinances to prevent any bison translocation into their counties by FWP or the USFWS without prior county commission approval. Current Montana law prohibits placement of bison as wildlife on private lands without landowner permission but does not prohibit placement of bison as wildlife within counties that have ordinances as described. While counties do not have legal authority over wildlife, FWP would work closely with counties *and* landowners to reduce conflicts in all cases.

Land Use: Restoration of bison should not lead to changes in existing land uses, such as timber harvest and energy exploration, unless mutually agreed upon by current users and the local citizens working group. Consideration would be given to efforts to ensure the presence of bison does not negatively impact other recreational uses such as hunting or hiking. County growth and planning documents would be considered.

Habitat Suitability: In 2011 FWP produced a report on habitat connectivity that mapped native habitats critical to wildlife and wildlife movement across the state (FWP, 2011 http://FWP.mt.gov/fishAndWildlife/conservationInAction/crucialAreas.html). One of products of this effort depicts continuous habitat blocks of more than 10,000 acres. A second product shows areas with the highest proportion of grassland or shrub habitat. Together these products point to areas where conditions and the human footprint are likely more suitable for bison restoration than areas with less suitable habitat or more human influence (Figure 3).

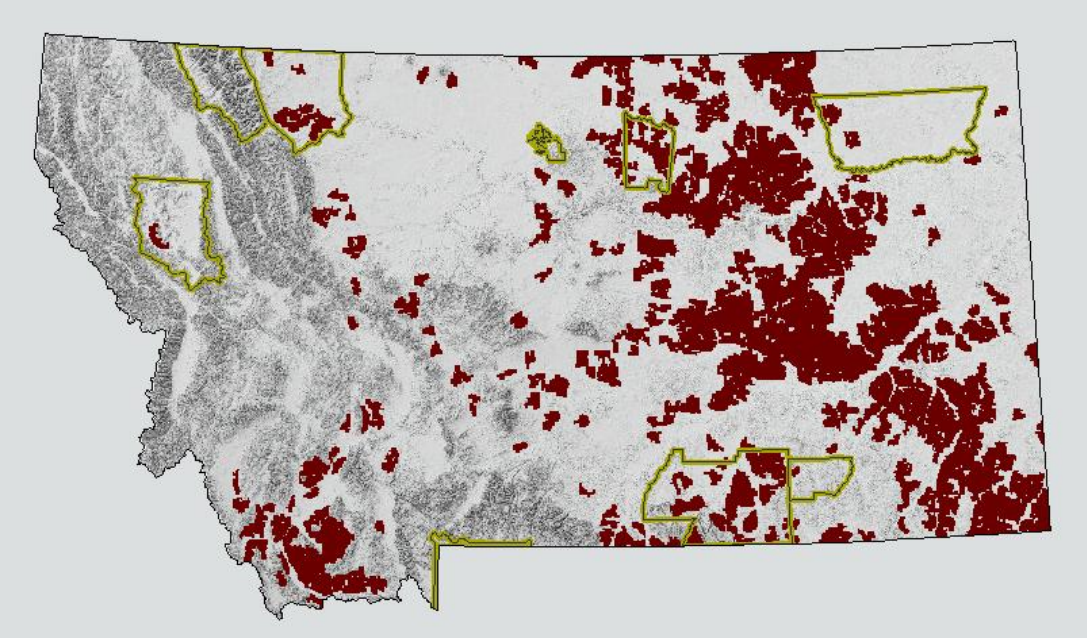

Figure 3. Native habitats critical to wildlife and wildlife movement across the state; dark polygons represent contiguous areas of grass shrub ecological systems with relatively low levels of human influence. Outlined areas represent tribal reservations and national parks.

Grazing Allotments: Current grazing allotments for domestic livestock should not need to be adjusted because of a bison restoration program unless mutually agreed upon by current allotment holder(s). Grazing allotment plans could be changed based on environmental conditions or other direction/desires from the land management agency with jurisdiction.

Pre-Bison Introduction Range Health and Utilization: A range assessment (§87-1-216 MCA) and determination of suitable habitat would have to be described and identified prior to any placement of bison. Natural Resource Conservation Service 'Ecological Site Descriptions' and assessment systems would be used to determine range health, which considers whether soil characteristics, site stability, hydrologic flow, and biotic integrity are operating within the normal range of variability. Monitoring of these factors would occur regularly to ensure range health if bison are introduced. Range assessment would also consider the current seasonal utilization by wildlife. Such assessments may already be available in some locations.

Domestic Bison: An assessment of location and numbers of domestic bison and the land they occupy would have to be conducted. Opportunities and criteria would have to be identified to ensure separation of any domestic and restoration bison. Contingency planning would have to occur to determine steps to be taken in the event of interaction between the groups.

Historical Presence of Bison: Bison were historically found throughout Montana with the largest year round populations in areas east of the Continental Divide (see map in Chapter

2, Roll and Fisher Jr. 2010). While historical presence would not have to be a requirement for any future restoration effort it is logical to assume bison existed historically in certain areas due to habitat suitability. Any restoration effort to areas where bison were not historically present in great number would have to be thoroughly evaluated to ensure adequate habitat is present.

Bison Source Herd Guidelines

Disease: Only bison that are certified as free of reportable diseases by the state veterinarian of Montana could be used for reintroduction. Wild or domestic, bison may carry a number of pathogens or parasites (see Section 2.3.6) but many of the restoration herds are free of reportable diseases of concern, and source bison can be obtained that are free of reportable diseases. Diseases of concern can be managed within restoration herds and are often absent in wild bison populations.

Genetics: Source bison must be free of cattle gene introgression. Potential sources could include bison from: 1) Yellowstone National Park, 2) Turner Enterprises' Castle Rock herd, 3) Elk Island National Park, 4) American Prairie Reserve's herd (originally from Elk Island), or 5) possibly the Henry Mountains herd. Fort Belknap and Fort Peck currently have bison from Yellowstone National Park. The source of any restored public herd should be tested using the Single Nucleotide Polymorphism, aka, SNPs technology.

Management History: Source bison would ideally come from an area where animals are treated more like wildlife than livestock. Bison coming from programs where hunting is used as a management tool are preferred as these bison would already be responsive to hunting pressure and may more quickly adjust to a new location and management actions designed to influence their distribution.

Sex Ratio: When reestablishing a bison herd and developing a management plan, geneticists recommend maintaining a sex ratio as close to 50:50 as possible. This would increase the competition between males, which is important for the genetics of the herd. It would also reduce inbreeding and could have the effect of slower herd growth. However, maintaining a near equal sex ratio could cause younger males to disperse to new locations. Management actions such as hunting could reduce dispersal behavior. A near equal sex ratio could reduce the growth rate of the herd, which could be a positive or a negative based on the program goals.

Age Composition: Since bison are social herd animals it would be important to maintain a social structure within the herd. Some recommend establishing a new herd with both adult and sub-adult bison to prevent the disintegration of the social structure. Others have proposed restoration plans using only sub-adult bison. Specific age composition of any restoration herd would be dependent on the specific site and project objectives.

Number of Animals to Reintroduce: The number of animals to reintroduce would depend on the condition and size of the site and the specific project objectives. Other restoration projects, such as the Alaska Wood Buffalo project introduced 100 animals while the Book Cliffs of Utah introduced 44 animals. Additional animals were released in subsequent years

as desired by the Utah management program. The following analysis assumes an initial soft release of 40 animals.

Herd Management Guidelines

A public bison herd should be managed with as little human interaction as possible. The management of bison, however, could be more intensive during an initial 'test' period to include monitoring movement and range use.

Native Ungulates: Reintroduction of bison should not displace other native ungulates from public lands beyond expected. Bison evolved alongside other native ungulate species, such as elk, mule deer, and pronghorn. When Yellowstone National Park transitioned to a natural management paradigm, Singer & Norland (1994) noted, "competition within the rapidly increasing ungulate guild was not so overwhelming that the population growth of any species was curtailed". Due to the limited number of wild herds, interactions between wild bison and other native ungulates have not been extensively studied, however bison do co-exist with these species in multiple locations (Knowles, 2001; Barmore Jr., 2003). Annual monitoring of ungulates in the restoration program area would be conducted similar to ungulate monitoring conducted across the state by FWP. Any changes in ungulate population trends would be considered within adaptive management strategies.

Sustainable Population Size: The bison would be managed at a level compatible with pre-defined, agreed upon population objectives considering sex and age ratios, harvest success, and dispersal risk (see also Range Carrying Capacity section). During initiation of any project to possibly include a test period the herd could be closely managed to a pre-determined population size. Following any initial phase the herd would be managed to the level supported by FWP, the citizen working group and any other involved entities, e.g., tribes, federal land managers and others. The population growth rate would be dependent on the age and sex ratio the restored bison. Regulated public and tribal hunting could be used to manage the population.

Herd growth varies depending on site conditions and environmental influences. The Mackenzie Bison Sanctuary herd increased at an average of 22.3% per year over a 26 year period after which the population growth declined (calculated from data in Larter et al. 2000). The National Bison Range herd experienced an annual increase of 22.1% from 1909 to 1922, at which point yearly removals were instigated (Gross et. al. 1973, Fredin 1984). The population growth rate in the Henry Mountains estimated from long-term index data (1949-1982) was 3.8% per year, but actual population counts from 1977-1983 showed an increase of 9.2% per year (Van Vuren and Bray, 1986).

Population Monitoring: Population monitoring and evaluation would be conducted to inform management decisions and track progress toward meeting objectives. Monitoring techniques could include aerial and ground surveys, and radio telemetry. Population estimates would be derived annually based on the number of animals counted during the survey, count conditions, ground classification, the number of animals harvested or culled, and a 5% natural mortality rate (Utah Department of Wildlife Resources technique for estimating the Henry Mountains and Book Cliffs bison herds.) In the Book Cliffs,

approximately one half of the animals were equipped with radio transmitters during the beginning of the project, which helped with population monitoring and management issues.

Disease Monitoring: The disease monitoring and response protocol for disease outbreaks for any bison at a restoration site would be coordinated among FWP, the MDOL, and the state's veterinarian. Measures to comply with any applicable animal health protocol required under Title 81, 2(b) or by the state veterinarian must be detailed in a herd management plan (§87-1-216(5a) MCA). Blood samples for annual herd health monitoring could be acquired through field capture. Following establishment of a hunting program, samples could be collected from hunters as is done in other restoration sites such as the Henry Mountains in Utah.

Release Technique: A release technique would be dependent on the specific restoration site and the population objectives. A soft release in which bison are initially held in a large enclosure may increase their tendency to remain in the new area assuming they develop some degree of site fidelity. Knowles (2001) notes that a soft release "would have a high probability of developing a herd range within the designated reintroduction area". The technique has been used by entities such as the American Prairie Reserve. A soft release provides greater opportunity to monitor bison health as animals can be observed during the acclimation period but does come with a higher cost.

Parks Canada plans to begin its project with a herd of predominantly young bison, which are generally better at adapting to new surroundings. The herd will largely be comprised of yearling and two-year-olds, but will include a few mature female bison to help lead the herd and respond to predators. The bison will initially be held and monitored in a temporary soft release paddock that will provide high-quality feed, shelter and water. After three-to-four months of acclimatization, the paddock gates will be opened and the bison will be free to move and forage within their new home range.

Some hard releases of bison result in animals that wander and are likely to travel 30 miles or more in search of their former range (K. Aune, pers. comm., 2014). This can lead to conflict with agriculture or livestock operations in surrounding areas. The International Union for Conservation of Nature document, *Guidelines for Reintroduction and Other Conservation Translocations* provides guidelines for wildlife restoration programs to include discussions of risk, release techniques, and monitoring of wildlife translocations. Such publications could be used to inform decisions on release technique.

Range Capacity and Range Monitoring: The herd would be managed at a level compatible with existing forage resources. FWP would have a forage analysis prepared by a 3rd party per the requirement of §MCA 87-1-216 (5)(e). Sustainable herd size must be established through such an assessment which could follow the NRCS Ecological Site Description system. This system assesses soil, site stability, hydrologic flow, and biotic integrity and determines whether each factor is operating within the normal range of variability. Range assessments must be conducted annually and could include different

seasonal measures. Continued monitoring of these factors would occur to ensure range health with the presence of bison after introduction.

The goals of restoring bison at a certain level would be to manage the vegetation for both grazing and/or browsing animals, including bison, other native wildlife, and perhaps domestic livestock. The following would be desired on the lands where bison are restored: 1) improve or maintain desired species composition and vigor of plant communities; 2) improve or maintain quantity and quality of forage for grazing and browsing animals' health and productivity; 3) improve or maintain surface and/or subsurface water quality and quantity; 4) improve or maintain riparian and watershed function; 5) reduce accelerated soil erosion, and maintain or improve soil condition; 6) improve or maintain the quantity and quality of food and/or cover available for wildlife; 7) manage fine fuel loads to achieve desired conditions. Monitoring and research projects could be designed to determine if these desired conditions are being met through the grazing and wallowing behaviors of bison which tend to create specific environments of greater plant diversity than surrounding areas. This increase in plant diversity is utilized by other animals and increases the diversity of wildlife within the region (Foresman, 2001; Picton, 2005; Gates et al., 2010).

Licht (2014) calculated bison herd capacity relative to percent resource allocation to inform the National Park Service's consideration of restoring bison to Badlands National Park (Table 3). Calculations are based on range productivity data for a normal precipitation year. All NPS units in the Northern Great Plains use some form of a plant productivity model as a primary factor in establishing bison population goals. Calculations such as this could be conducted and included as part of a site-specific Environmental Assessment.

Site	Acres	Herd Size* (15% Resource Allocation)	Herd Size* (33% Resource Allocation)	Herd Size* (50% Resource Allocation)
Site A	24,122	388	854	1,294
Site B	96,680	1,666	3,666	5,554
Site C	126,679	2,370	5,214	7,900

*Includes calves

Table 3. (adapted from Licht, 2014). Estimated bison herd capacity by site and percent resource allocation for Badlands National Park.

Herd Containment/Contingency Planning: FWP would be responsible for managing any public herd so that it remained within the location selected for bison restoration. The management plan for the public herd would need to meet the legal requirements for wild bison in Montana. FWP and the citizen working group would develop the extent of where bison would be managed and make changes based on the information gained during any test period. The containment strategy must describe the following per §87-1-216(5ci) MCA: 1) the specific area where the bison are to be contained; 2) fencing or other

containment measures to be used to contain the herd; 3) a contingency plan to expeditiously relocate bison that enter lands where they are not allowed; 4) a contingency plan to expeditiously fund and construct more effective containment in the event of an escape; and 5) a contingency plan to eliminate or decrease the size of designated areas, including the expeditious relocation of bison if the FWP is unable to effectively manage or contain the bison. FWP is liable for all costs incurred, including costs arising from protecting public safety, and any damage to private property that occurs as a result of FWP's failure to meet the requirements of containment (§87-1-216 (7) MCA). FWP is only liable for damage when all efforts to follow a management plan endorsed by the local citizen working group have not been made.

Animal Tracking: Measures to comply with animal identification and tracking protocols required by the Montana MDOL to identify the origin and track the movement of bison must be detailed in the herd management plan (§87-1-216 (5b) MCA). A specific animal tracking plan would be included within the overall management plan and would have to be developed by the MDOL and FWP, and specific to the restoration action and site (§87-1-216 (5b) MCA).

Public Harvest and Access: Public access would be necessary for wildlife viewers or hunters to access restoration bison. Regulated public hunting would be used to control the herd size to maintain a population that is compatible with private landowner tolerance and range capacity. A harvest strategy would be designed to assist with maintaining the herd within population objective and within a pre-determined area of acceptable habitat use/dispersal. Licht (2014) found that 15% mortality of 1,000 animal bison herd is needed, on average, to keep the population stable. Mortalities could be from harvest, management culling, or natural mortalities.

In the Henry Mountains of Utah and Grand Tetons of Wyoming hunters are issued either sex or cow/calf permits at whatever level is needed to meet management objectives for the population and/or distribution. These permit levels are adjusted annually. If the desire is to stabilize or reduce the population additional cow/calf licenses are issued. If there are problems with animals (generally males) leaving the desired occupied area the number of either sex or bull only tags is increased. Additionally, tags are sometimes issued for a specific problem area to eliminate a few animals in areas beyond the desired occupied area.

Human Safety: Techniques to reduce threats to recreationists, hunters, herd managers, and motorists would be included within the containment strategy for any restoration program. Bison, similar to other large herbivores, including moose and elk, pose small, but manageable risks of personal injury (Nelson, 1965; Fortin and Andruskiw, 2003; Taylor and Knight, 2003; Gates et al., 2010). The level of risk is often dependent on the type of management program that is in place. The manner in which bison respond to humans depends on factors such as the level of habituation to humans, hunting pressure, and management practices. Habituation is defined as "a diminishing response over time to a repeated neutral or unreinforced stimulus" (Zinn, 2008, p. 389). The bison in YNP are very habituated contributing to bison-human conflicts as individuals attempt to approach, pet or feed bison (Conrad and Balison, 1994; Olliff and Caslick, 2003). Site specific programs

would be identified and developed in order to minimize potential threats to human safety. Wildlife underpasses, fencing, and signs are already being used in some areas of Montana to reduce conflicts with wildlife on roadways. Educational programs could be implemented to inform residences and visitors of appropriate behavior and safety precautions to take when in areas where bison may be present.

Research: FWP would work with other agencies and stakeholders to identify priority management concerns and conservation issues that need to be addressed with research, such as containment technique effectiveness, patterns of herd dispersal, population demographics, seasonal range use, foraging and range ecology, effects of bison use on cattle allotments, interactions between bison and native wildlife and/or domestic livestock, etc. FWP would work with subject matter experts, statisticians, and scientists to design projects that would address these research needs. The ensuing projects would provide the necessary information to improve management and conservation efforts for bison. These projects may be run by state, federal, independent, academic, or nongovernment organization scientists. Specific projects requiring multiple areas of expertise or multi-entity involvement could be tackled by a collaborative team of scientists, biologists and topic experts.

Program Implementation Guidelines

Approval Process for Animal Transplants: Similar to big horn sheep transplants, any movement of bison into or within the state for reintroduction would require public input and Fish and Wildlife Commission approval. Montana statute instructs that "importation for introduction or the transplantation or introduction of any wildlife is prohibited unless the Commission determines, based upon scientific investigation and after public hearing, that a species of wildlife poses no threat of harm to native wildlife and plants or to agricultural production and that the transplantation or introduction of a species has significant public benefits" (§87-5-711 MCA). The Fish and Wildlife Commission may approve the introduction of wildlife only if it is "subject to a plan developed by the Department to assure that the population can be controlled if any unforeseen harm should occur" (§87-5-713 MCA). Legal statutes also require that the commission and FWP consult with "the Departments of Agriculture, Public Health and Human Services, and Livestock in all matters relating to the control of wildlife species and exotic wildlife that may have a harmful effect on agricultural production or livestock operations in the state or that may pose a risk to human health or safety" (§87-5-716 MCA).

Management Agreements: Management agreements in the form of Memorandums of Understanding would have to be completed with any private landowner or tribal entity that agrees to host a restoration bison herd. As with all MOUs, there must be trust and commitment between all parties. MOUs would have to include but not be limited to:

- Adaptive strategies to meet containment requirements
- Adaptive strategies to meet herd objectives
- Commitment to and strategies for disease monitoring and response if disease is detected
- Commitment to and strategies to implement the agreed to exit strategy if needed

- Agreement on liability responsibilities of all parties involved in the restoration program and proof of insurance to cover any claims as appropriate
- Commitments to annual reporting and involvement with information and outreach efforts
- Strategies for working with a citizen working group
- Commitments for allowing public access for bison viewing and hunting
- Commitments to honor FWPs continued management of bison and any agreements that may change ownership of offspring
- Commitments to provide resources as needed as agreed to in other sections of the MOU

Citizen Working Group: A citizen working group would be formed for any bison restoration project although FWP would maintain authority for management (§ 87-1-201 MCA). FWP has a long history of working with stakeholders and citizens when making wildlife management decisions, e.g., sage grouse advisory council, wolf management advisory council. The role of the working group would be to recommend adaptive management strategies, serve as a sounding board for the public and involved management agencies, and to monitor success or failure by agreed to standards set forth in the management plan. The role of the agencies would be to implement appropriate recommendations of the group within the statutes and legal mandates of those agencies. Meetings of the working group would be open to the public.

Membership of the group would be open but should include representation from at least the following stakeholders:

Local landowners	Sportsmen and women
Local business persons	Local livestock owners
Local ranchers with crops	Wildlife advocates
Local conservation districts	Local county commissions
Pertinent tribes	Local domestic bison producers
Recreationists	Pertinent non-government organizations

Technical representatives must include personnel from:
- FWP
- Pertinent land management agencies

Bison management programs in different states and Canadian provinces use bison working groups and citizen involvement in a variety of ways. Utah's North Book Cliffs Bison Planning Committee was created in 2006 to examine the potential of reintroducing a public herd to the region. The committee was made up of a diverse collection of public agencies, private landowners, and interest groups. The committee established management goals and reintroduction plans.

Parks Canada, the Saskatchewan Ministry of Environment, and the Sturgeon River Plains Bison Stewards (SRPBS) have a process to develop and implement a long-term, adaptive

management plan for the Sturgeon River Plains Bison Herd. This planning process is unique in that the federal and provincial governments have agreed to allow SRPBS, which represents private landowners, to assist as a full partner in development of this plan" (G. Vaadeland, SRPBS, pers. comm., 2014). Similarly, Canada developed a new management plan for the bison herd in the Yukon, recognizing that a cooperatively developed and publicly sanctioned management plan for the Aishihik Wood Bison Herd would ensure the varied interests in the conservation and management of the population are heard and addressed (Government of Yukon, 2012).

The Delta Bison Working Group (DBWG) in Alaska was established in 1992 to bring citizens into the planning process. The DBWG assists the Alaska Department of Fish and Game by helping to establish the appropriate balance between the competing interests of the bison herd and agricultural development. Specifically, the DBWG was asked to assist in development of management options and recommendations (DeBois and Rogers, 2000). The group also works to promote communication among the public, bison interests and the state wildlife agency (DeBois and Rogers, 2000).

Timelines: The management plan for any restoration effort must include detailed timelines for site preparation, bison releases, population monitoring, success or failure measurements and contingency planning. Timelines would be set cooperatively by partners and detailed within any site-specific EA.

Annual Monitoring: Monitoring reports must be completed annually and made available to the working group and the general public. Monitoring reports would: 1) track progress towards population objectives; 2) document any failures of containment; 3) report on range health monitoring; 4) report any research findings; 5) report any conflicts and resolution of these conflicts and 6) document annual project costs.

Range health: FWP would work to improve habitat conditions through appropriate actions such as water source developments, vegetative or mechanical treatments, prescribed fires, or reseeding if and when determined necessary by monitoring. Management plans would include detailed plans for managing range health to include:

- Goals and objectives that are clearly stated.
- Resource inventory that identifies existing resource conditions, concerns, ecological site potentials, and opportunities to enhance conditions.
- Location and condition of existing and planned structural improvements such as fences and water developments including seasonal availability, yield and quality of watering sites.
- Forage inventory of the expected forage quality, quantity and species of forage in each management unit(s) during the grazing period.
- Forage – Animal balance developed as a sustainable grazing plan for the management unit(s), which insures forage produced or available meets forage demand of livestock and/or wildlife of concern.

- Grazing plan for bison that identifies periods of grazing, rest and other treatment activities for each management unit. The plan identifies type and location of any structural practices needed to facilitate the grazing system.
- Contingency plan that details potential problems (i.e., severe drought, flooding) and serves as a guide for adjusting the grazing prescription to ensure resource management and economic feasibility without resource degradation.
- A monitoring plan with appropriate records to assess whether the grazing strategy is meeting objectives. Refer to Prescribed Grazing (Code 528) Standard and Specification in Section IV of the Field Office Training Guide for the minimum requirements for monitoring.

(The above bulleted items were copied from NRCS Prescribed Grazing (Code 528) Standard - refer to Section IV of the Field Office Technical Guide.

Continued Use of Public Land Allotments: Most BLM livestock grazing allotments are administered under 10 year, renewable permits. Assurance of allotment use beyond those 10 year permits is at the discretion of the local BLM office. Under BLM guidance and policy, bison classified as wildlife would be subject to different management than bison classified as livestock. Cooperative agreements or options for bison as wildlife to graze BLM lands may be available, but would require agreed upon terms by the landowner, FWP, and BLM.

Similar to BLM, the USFS would treat bison as wildlife and bison as livestock differently with respect to its permits and management agreements. An allotment specific analysis and evaluation to comply with National Environmental Policy Act would be done to allow bison as wildlife on USFS lands. Final terms would require agreement by the landowner, FWP and the USFS allotment decision maker, i.e., the USFS District Ranger or Forest Supervisor.

Game Damage: Conflicts between bison and private landowners would be handled through existing FWP game damage programs with a focus on proactive measures to protect property and stored crops. Damage to property and crops is defined as "damage to real property or cultivated agricultural crops." Wildlife presence on, or consumption of, non-cultivated grass or pastureland does not constitute damage qualifying for assistance under this program (FWP Game Damage Policy, page 2, DOO610, August 30, 2002). FWP may authorize assistance in the form of hazing, dispersal devices, temporary or permanent fencing materials, special hunts, kill permits, or game damage supplemental licenses. Such action may be taken only if affected landowner meets all other eligibility criteria for game damage assistance. Definitions of eligibility are found in §87-1-225 MCA; A landowner is eligible for game damage assistance if he/she: (a) allows public hunting during established hunting seasons; or (b) does not significantly reduce public hunting through imposed restrictions. FWP may provide game damage assistance when public hunting on a landowner's property has been denied because of unique or special circumstances that have rendered public hunting inappropriate. Game damage assistance related to bison would undoubtedly need to be considered as a special circumstance but would ultimately need to be considered within the existing authority of FWP.

Landowner Incentives: Incentives would be dependent on the site selected and the current uses of the area. FWP does not pay for private landowners to host native species on their lands (State v. Rathbone 110 Mont. 225, 100 P.2d86 (Mont.1940). However, FWP does assist in the conservation of private lands, particularly when the conservation of those private lands provides unique or critical resources for wildlife. Any incentive program would be designed to ensure the targeted lands would provide the habitat necessary for the variety of native species including a restored bison herd. For example: 1) long term leases through the Upland Game Bird Habitat Enhancement program pay for the maintenance of healthy upland game bird habitats that also provide habitat for a diversity of songbirds; 2) perpetual conservation easements purchased by FWP in mountain foothill settings have secured winter habitat for elk herds along with other wintering wildlife. Conditions of these agreements have included, implementation of rest-rotation grazing systems or other practices that conserve native plant communities and ensure available forage for native ungulates and cover and food for other wildlife species. Landowners and FWP could also work with the Natural Resources Conservation Service Farm Bill programs to explore options for restoring or managing native habitats for the long term to support bison.

The Matador Ranch in north-central Montana is involved in a grass bank program through the Nature Conservancy that offers discounted grazing fees on the Matador in exchange for wildlife friendly practices on home operations. The American Prairie Reserve has a program titled 'Wild Sky Beef' that purchases and markets beef raised on ranches that implement wildlife friendly land management practices. Such programs are examples of creative ways that could be used to incentivize landowner participation in bison restoration.

The USFWS has the Partners for Fish and Wildlife program that has equally creative ways to incentivize landowners to tolerate wildlife. Through technical assistance and cost-share incentives this program has re-established natural biological communities and ecological process, increased citizen and community-based stewardship efforts, and contributed to the recovery of at-risk species. Finally, non-government organizations in the past have promoted the restoration of species, in particular carnivores, through payments to landowners for lost livestock.

Incentive programs could be developed by non-government organizations or agencies to increase social tolerance of bison. Any incentive program would have to be carefully negotiated and crafted to ensure landowner benefit and adherence to standard practice and legal statutes of FWP. Appropriate incentives for projects would be developed by a citizen working group.

Adaptive Management: The management plan for any restoration effort must include adaptive strategies to address changing situations or unforeseen circumstances. Regular monitoring of the population and range health would inform any decisions to veer from the management plan. Population objectives established within the management plan would be used as the guide for determining whether the herd size is within an acceptable range. Maintenance of healthy range conditions would be the goal of managing the herd within

objective. Population numbers, population trend, herd distribution, age-sex structure or herd health could all inform a decision to increase, reduce, or eliminate a hunting season. Implementation of the agreed to exit strategy could occur if herd distribution or size becomes unmanageable for some unforeseen circumstance such as a range fire that removes critical forage or extreme winter conditions that result in an ineffective containment strategy. Alternatively, a herd below population objective could result in population augmentation in attempts to boost the population numbers or perhaps to address unacceptable genetic diversity. The intensity of monitoring could be adjusted within reason and resources if concerns arise about herd size being outside objective or range conditions being less than desired. As this herd would be monitored intensely it would be straightforward to determine when alterations to the management plan are needed.

Contingency Strategy: A contingency plan would be developed describing strategies to address disease outbreaks, bison moving to areas outside of the target area, unacceptable impacts to local landowners, extreme environmental conditions that render the range inadequate for a bison herd, or other potential management issues. Per §87-1-216 MCA, any containment strategy must describe contingency plans to include: 1) a contingency plan to expeditiously relocate bison that enter lands where they are not authorized to be; 2) a contingency plan to expeditiously fund and construct more effective containment in the event of an escape; 3) a contingency plan to eliminate or decrease the size of designated areas, including the expeditious relocation of bison if the Department is unable to effectively manage or contain the bison. The Department is liable for all costs incurred, including costs arising from protecting public safety, and any damage to private property that occurs as a result of the Departments failure to meet the requirements of containment (§87-1-216 (7) MCA). FWP would only be liable for damage when all efforts to follow a management plan endorsed by the local citizen working group have not been made.

Exit Strategy: If bison behavior, movement, or distribution patterns become unacceptable and/or the costs to maintain a program become impractical, the program would be re-evaluated and bison could be removed from the program site. The citizen working group would discuss and determine an appropriate response to any unexpected situations or consequences of the program.

Specifically in the event of a disease outbreak within a restoration herd, FWP and the citizen working group would determine an appropriate response that could include removal of all animals. Per §87-2-730 MCA, project animals could be removed through public hunting after being exposed to or infected with a contagious disease as coordinated between FWP and the MDOL. The emergence of a management situation that could not be successfully addressed could lead to implementation of an exit strategy. In Arizona, for instance, bison became more difficult to manage as hunting pressure and natural movements forced them into areas that were difficult for hunters to be effective or into areas where hunting was prohibited (Grand Canyon National Park). Such a situation in Montana could lead to implementation of an exit strategy.

Funding/Cost: Any restoration project plan and site-specific EA would have to include a thorough discussion of budgets and funding sources for both short term and long term project implementation and could include details on the following:

- Cost of bison transport and release
- Costs of containment set up and maintenance
- Costs of disease monitoring and specific herd management to include staffing
- Costs of range management to include staffing
- Costs of contingency plan implementation in the event of an unforeseen circumstance
- Any predicted costs to local communities in the way of increased local services
- Any loss of state income in the form of lost per capita livestock fees
- Any change in local tax revenue due to a shift from domestic livestock to bison as wildlife on an operation
- Any predicted income from the project, e.g., increased visitation to the area by wildlife viewers or hunters

Funding sources would vary dependent on program objectives and specific restoration site locations but could include FWP, private, and tribal sources. Any burden on Montana taxpayers or local communities would be minimized to the extent possible and would have to be carefully considered within an EA. By statute (§87-1-216 (7) MCA) any bison management plan needs to include identification of long term, stable funding sources and funding for effective containment measures.

Costs can vary considerably depending on the restoration approach recommended. Depending upon the alternative chosen, costs to agencies or partners may be zero or substantial (see section 4.4.7). It is difficult to define costs of a program because it is unknown at what scale a program may be implemented.

Information and Outreach: A coordinated FWP public information and outreach effort to outline restoration project objectives, herd management, long term goals, funding sources, etc. would be needed. The effort would be coordinated with land management agencies, tribal entities, and private landowners. The experiences of other states and provinces with bison programs where bison are managed as wildlife would be included in information efforts. Specific efforts would be made to build connections around bison among tribal entities, sportsmen and women, wildlife viewers, local community members and others. An outreach program would include efforts to explain bison as a wildlife species, within current conditions, land uses, and human populations.

3.3.2 Test Project Option for Implementation of Alternative #2, #3, or #4

The above guidelines could be used to implement a five year test project on any of the landscapes described within Alternatives #2-4. A public herd managed by FWP could begin with a small number of animals that would be closely monitored for the test period. A project could begin with 40-50 bison, which is the herd size other programs have started with, including the Book Cliffs project in Utah. A soft-release approach could be used to

condition the animals to the release site and develop site fidelity to limit dispersal out of the target area. All project expenses including any facility construction would have to have dedicated funding prior to project implementation. Within the test period the bison would be closely monitored which could include both ground and aerial monitoring and radio marking of adult animals. Herd containment needs would be determined based on the specific restoration site but could include fencing.

Range monitoring would be conducted during the test period. At a minimum the monitoring program would measure changes in plant biomass and composition over time, bison use of water resources, and bison habitat use. The results from such monitoring would be fed back into management decisions. One or more research projects could be developed to specifically answer questions about range use, herd movement, and herd growth. The herd could be allowed to grow naturally during the test period and could also receive periodic augmentations depending on the desire of the landowners, project cooperators, and FWP. A test project could be extended in time to allow for evaluation of a larger herd size using a large area.

A citizen working group would be involved in development, implementation, monitoring, and evaluation of a test project. The role of the working group would be to recommend adaptive management strategies, serve as a sounding board for the public and involved management agencies, monitor success or failure by agreed to standards set forth in the management plan. Working groups have been used to help guide other restoration programs to include groups within the Henry Mountains, Sturgeon River, and Wood Bison restoration areas.

A test project would comply with all applicable statutes and strive to minimize negative impacts to surrounding landowners, communities, exiting land uses, and existing wildlife resources within the area. Any test project would follow the implementation guidelines described above in section 3.3 to include: 1) project site guidelines; 2) bison source herd guidelines; 3) herd management guidelines; and 4) program implementation guidelines. In particular a test project would: 1) only use animals free of reportable diseases and free of cattle gene introgression; 2) involve a pre-restoration range assessment; 3) have a well thought out containment and management plan; 4) have secure full funding for the five year period; and 5) have local community involvement. Prior to the implementation of a test project, a management contingency plan would be developed describing strategies to address disease outbreaks, bison moving to areas outside of the target area, unacceptable impacts to local landowners, extreme environmental conditions that render the range inadequate for a bison herd, or other potential management issues. An exit strategy would also be developed to end the project if management issues arose that could not be addressed through the contingency plan.

The level of public access for viewing and hunting would be described within the test project plan and implemented as appropriate dependent on herd size, growth, and distribution. Public hunting could be used to control distribution of a test herd as allowed within the project plan. Herd management would have to be implemented within constraints of any research projects in order to ensure quality research methods are

followed. Funding would depend on the intensity of monitoring and research desired, and population augmentation costs if desired. Estimated costs of any containment need to include fencing, hazing, or other measures. A test project would allow FWP and cooperators to learn more about how bison use any particular habitat. Annual reports would be made available and would fully report on the herd, range, and any research findings. An outreach program would be developed to ensure the local community and interested parties statewide were updated on progression of the test in addition to informing surrounding landowners, recreationists or site visitors what to expect from bison in the area.

3.4 Alternative #2: Restoration of a Publicly Managed Bison Herd on the Private and/or Public Lands of Willing Landowner(s)

A landowner(s) would be identified who is willing to accept specific management responsibilities of publicly-managed bison. FWP would have primary jurisdiction over the bison. The private landowner(s) could own and/or manage any or all of the intermingled parcels of private land, state land leases and federal permits in the identified focus area. Implementation of this alternative could be done at various scales, i.e., small herd or large herd. Implementation at any scale would follow the guidelines listed above. The difference between Alternatives #2 and #4 is the program size and the level of competition with domestic livestock. This alternative could be implemented on a small scale, in an area where livestock currently graze.

Bison would interact with existing native wildlife and ecological processes. Agreement between FWP and private landowner(s) could include specific direction about land management activities. Access would be required for public hunting and bison viewing. Any hunting program would have to be agreed upon by the citizen working group, FWP, and landowner(s) to include clarification of possible financial incentives for allowing public access.

Any change in land use on a privately owned property or on public lands would be at the discretion of the land owner. Livestock stocking and grazing management decisions would be at the discretion of the landowner(s). Range assessments (§87-1-216 MCA) would be needed prior to finalization of any agreement. The landowner could give up current livestock grazing options in exchange for grazing bison as wildlife. All bison moved to private land would need to be certified free of reportable diseases as determined by the MDOL and state veterinarian. Disease monitoring and response protocol for potential disease outbreaks would be coordinated by FWP, the Montana MDOL, and state veterinarian and followed by private landowner(s).

A piece of land large enough to support an initial release of 40 bison would be sought. The landowner(s) would be held to managing their land to the best of their ability to maintain the herd within agreed to conditions (catastrophic events notwithstanding). Herd composition and population goals appropriate to the site would be determined by a citizen work group, FWP, and landowner(s). The herd plans would have to be in accordance with

Montana laws. Habitat assessments would be needed to address range capacity on an annual basis including all seasonal use.

3.4.1 Case Study #1 for Restoration on the Private and/or Public Lands of Willing Landowner(s) : Utah's Henry Mountains Herd

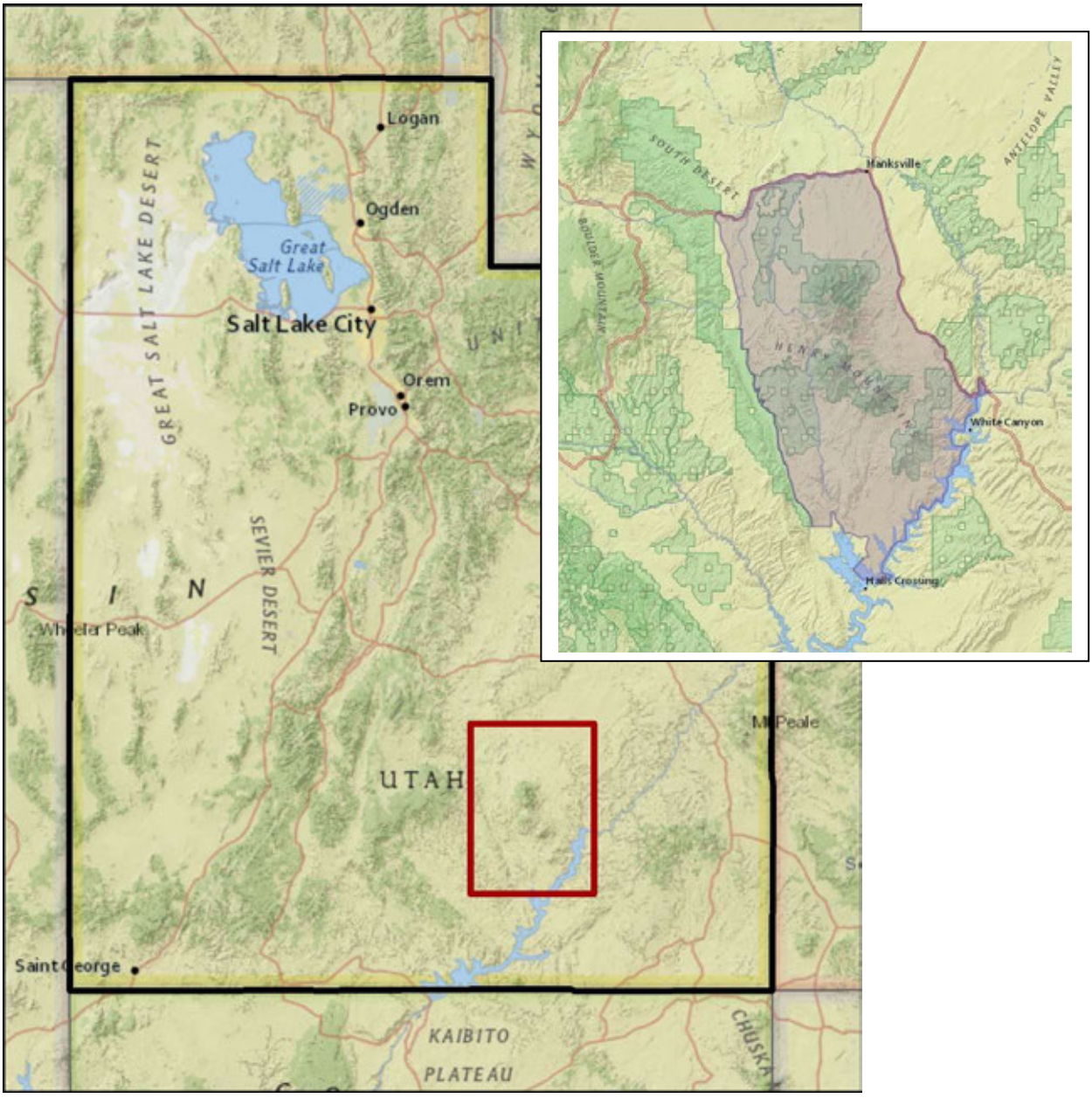

Figure 4. Area of Utah where the Henry Mountains bison herd is managed.

Primary Objective(s) for Bison: The Henry Mountains bison herd is managed for hunter harvest, long term population persistence, genetic conservation, and as a source for other conservation populations (DOI, 2014).

Ownership of Bison: Bison in the Henry Mountains are publicly managed by the state of Utah and 'owned' by the citizens of the state.

Jurisdiction/Agency Responsibilities: The Utah Division of Wildlife Resources (UDWR) primarily manages the Henry Mountains bison herd. The Bureau of Land Management (BLM) and the School and Institutional Trust Lands Administration have cooperative jurisdiction due to the public lands within the area. The Federal Land Policy and Management Act of 1976 gives BLM the authority to manage non-wilderness lands for multiple uses including fish and wildlife conservation but the state retains jurisdiction over managing resident wildlife populations (DOI, 2014).

Herd Details and Management of Herd on Site: A 'wild' herd was reintroduced to the region in 1941 with 18 bison from Yellowstone National Park. Five bulls were added in 1942, following dispersal by some of the original bulls. There has not been a need for additional augmentation to the herd since that time (UDWR, 2007b). The post hunt adult herd size from 2011 -2015 ranged between 296 and 329 with an average of 312. The objective is 325 adults post hunt so the current population is slightly below objective. There has been political and social debate over the appropriate population objective (Wade Paskett, pers. comm., 2014) even though this objective was established based on range carrying capacity (DOI, 2014).

The herd is generally unfenced with the exception of some drift fencing strategically placed to keep bison from entering Capital Reef National Park. Overall problems with bison outside of the target area have been minimal perhaps in part due to opportunities to haze or kill bison that leave the management area or use lands where they are not welcome. Herd size is managed through hunting and some capture and translocation. In 2009 when the herd was over objective animals were captured and translocated to the Book Cliffs of Utah.

Though parts of the region have significant physical barriers to bison movement, it is probable that population management through hunting has had the greatest impact on herd dispersal. Due to concern that hunting pressure could move animals off the management area, the annual desired permit level of 60-100 permits is managed through a series of split seasons. Some 15-25 permits are issued per season to avoid heavy hunting pressure at any one time or any one location.

Range monitoring and studies are part of the ongoing management programs. There is an interagency range crew, led by the state in cooperation with the BLM and USFS that completes monitoring assessment transects every five years. Additional monitoring is conducted as needed.

Disease management is an ongoing concern for the Henry Mountains herd with three main diseases of note: brucellosis, tuberculosis, and malignant catarrhal fever (UDWR, 2007b). Following the detection of positive titers for brucellosis within the herd in 1962, the herd was corralled, tested, and inoculated for brucellosis. Individual bison suspected of infection were marked and then released for sport hunters to cull. According to all evidence,

brucellosis was successfully eradicated from the Henry Mountains bison herd in the 1960s through capture-test-vaccination and test-harvest-cull of positive reactors (DOI, 2014). Blood from hunter collection kits is tested annually, with no indication of the presence of the disease since 1963 (UDWR, 2007b).

Testing for tuberculosis in 2001 indicated that the disease was not present within the Henry Mountains herd (UDWR, 2007b). There are currently no active sheep allotments in the area as the past active allotments have been changed to cattle allotments in order to reduce the chance that sheep could transmit malignant catarrhal fever to bison (UDWR, 2007b).

Some genetic testing of bison in the Henry Mountains has been completed but more extensive genetic work is planned (DOI, 2014). Preliminary results indicate there is no cattle gene introgression in this herd.

Size and Habitat of the Restoration Area: The area occupied by bison within the Henry Mountains Wildlife Management Area is 300,205 acres (469 mi2) and ranges from 4,800 to 11,500 feet in elevation. The area includes approximately 4,203 acres of private land (UDWR, 2007b). The region consists of steep mountain slopes, flat mesas, deeply eroded canyons, benches, and foothills, which support salt desert shrub, pinyon-juniper, mountain brush, aspen-conifer, and subalpine vegetative communities (UDWR, 2007b). Bison have proved very adaptable and have utilized all of the elevations, topography, and plant communities within the area (UDWR, 2007b).

Ecological Interactions: The bison share the range with native ungulates including mule deer and pronghorn, and both cottontail and black-tailed jackrabbits. As wildfire is a natural, ongoing process in the area (DOI, 2014) the state and BLM have used prescribed fire, mechanical treatments, and reseeding to improve over 40,000 acres of habitat for grazers. These projects are to benefit wildlife in general, not because of habitat degradation by bison. Habitat work in this area varies between $50,000- 150,000 per year funded by sporting groups as well as UDWR, BLM, and others.

The state has not reduced tags for other species as a result of bison in the area. In 2000 the mule deer population was at 400 animals. Today it is estimated at 2,200 with an objective of 2,000 (Wade Paskett, pers. comm., 2014.). Mule deer with their preference for forbs are negligible competitors with other grazers (Van Vuren, 1983). A small number of elk, 20-30 animals, occupy this area but are generally discouraged as elk occupancy is not desired for the Henry Mountains. The BLM and, the UDWR has indicated a preference for a focus on bison and mule deer management over elk. Studies in the Henry Mountains have found that bison grazing caused no significant impacts on plant species composition (Ware, et al, 2014; Ranglack et al., 2015).

Historical Presence of Bison: The Henry Mountains are within the historical range of Plains Bison but most likely were used seasonally and never sustained high population densities due to the lack of water (DOI, 2014).

Current Uses of the Restoration Area

Recreation: Bison can be viewed by the public and harvested by hunters from roads throughout the Henry Mountains (DOI, 2014). Public hunting of the Henry Mountains bison has been an essential part of the management program. Over 10,000 applications are submitted annually for 60-100 highly sought after once-in-a-lifetime permits. UDWR issues hunting permits by lottery according to the population target and range conditions. The annual harvest is about 55 bison (either-sex and cow-only combined) (DOI, 2014). Managers note that there is an average hunter success of 77% (Wade Paskett, pers. comm., 2014.). There has been an increased effort by sportsmen and women and landowners to work together to reduce bison conflicts. Sportsmen's groups have spent hundreds of thousands of dollars on range enhancement and water resources, and have assisted livestock producers with fence repairs.

Grazing/Agriculture: Bison and cattle have coexisted within the Henry Mountains since 1941. The bison range includes some cattle grazing allotments and one vacant sheep grazing allotment (DOI, 2014). There are 25,600 cattle AUMs permitted on the Henry Mountains range land during the winter and 2,600 during the summer. This is the equivalent of about 4,200 cattle present at any given time in the winter and about 800 cattle present at any given time in the summer (Ranglack, et al., 2015). As the population of bison has increased, so have tensions with regional landowners. Some ranchers have expressed concern over summer bison use of winter cattle grazing allotments (DOI, 2014). Efforts to mitigate these issues include the creation of the Henry Mountains Bison Committee a group that strives to find a balance in uses and general support for the herd.

Cattle are contained successfully with fences that the bison seem to navigate around or over providing them broader access to the area. On occasion, bison go through fences as well. Studies in the region have indicated that while bison and cattle often use different habitats, with bison grazing at higher elevations than cattle, there is substantial overlap in range use (Van Vuren, 1983; UDWR, 2007b). A recent study in the Henry Mountains found that bison at current densities have less of an impact on the grazing resource than lagomorphs (primarily jack rabbits) and cattle (Ranglack et al., 2015). Overall, cattle removed 52.3% of the total grass biomass while jackrabbits removed 34.1%, and bison removed 13.7%. Data from the Ranglack et al. (2015) study found that at the present population density, the Henry Mountains bison herd causes a very modest reduction in the forage available for cattle. Ware et al. (2014) found that that high intensity summer bison grazing, while likely creating short-term reductions in forage availability, has not caused differences in plant community composition or productive potential in the Henry Mountains.

Within the arid climate of the Henry Mountains, grazing capacity is often limited for both cattle and bison by environmental factors. The BLM, UDWR, conservation organizations, and sporting groups have worked together to ensure that grazing continues to be shared by bison and cattle within the area. This effort has been supported by the creation of a Resource Management Plan, Grazing Allotment Plans, and the purchase of grazing privileges from willing sellers (UDWR, 2007b). There have been substantial efforts by agencies and groups to improve the grazing habitat for livestock, bison, and mule deer.

These programs have included prescribed burns, mechanical treatments, reseeding, and improvement of water sources (UDWR, 2007b). The UDWR invested over $600,000 into a study through Utah State University to improve survey techniques, document habitat use, and evaluate use of range resources by both bison and cattle.

The impact of bison on regional agriculture has been limited. Damage by bison has been limited to drought years and is usually of short duration and low impact (DOI, 2014). Bison strayed onto irrigated agricultural fields during at least two periods of drought in the past 20 years. In both instances the bison were hazed from the fields and the landowner was compensated for damages (UDWR, 2007b). Some low-elevation pastures have been fenced to exclude bison from alfalfa and grass hay fields (DOI, 2014). There have been two damage compensation requests related to bison in the past 30 years and approximately $2,900 total has been paid for damage (Bill Bates, UDWR, pers. comm., 2014). The state and BLM work closely with grazing permittees and community groups to address conflicts over habitat and water resources (DOI, 2014).

Socio-Political Environment: Some conflict among sportsmen and women and agricultural producers has occurred in the area. Efforts to mitigate these issues included the creation of the Henry Mountains Bison Committee. Public support and/or tolerance of the herd appears to have increased following the creation of this group (Bill Bates, UDWR, pers. comm., 2014).

Landowner Incentives: Private landowners within the area are eligible for habitat improvement work on their lands funded with UDWR dollars. Landowners are also eligible to participate in Utah's program that allocates deer, elk, and antelope tags to landowners that can be sold to hunters for private profit.

Reduced Risk of ESA Listing: This herd is probably not large enough at its current size to significantly impact any ESA decisions.

Funding: The project is funded with a combination of UDWR, BLM, and sportsmen and women dollars. Survey and management costs for this herd average $25,000 annually. The Henry Mountains area is a high priority for hunters and as a result of bison and trophy mule deer in the area they invest $100,000 per year on wildlife enhancement projects.

3.4.2 Case Study #2 for Restoration to the Private and/or Public Lands of Willing Landowner(s): Montana's American Prairie Reserve Herd

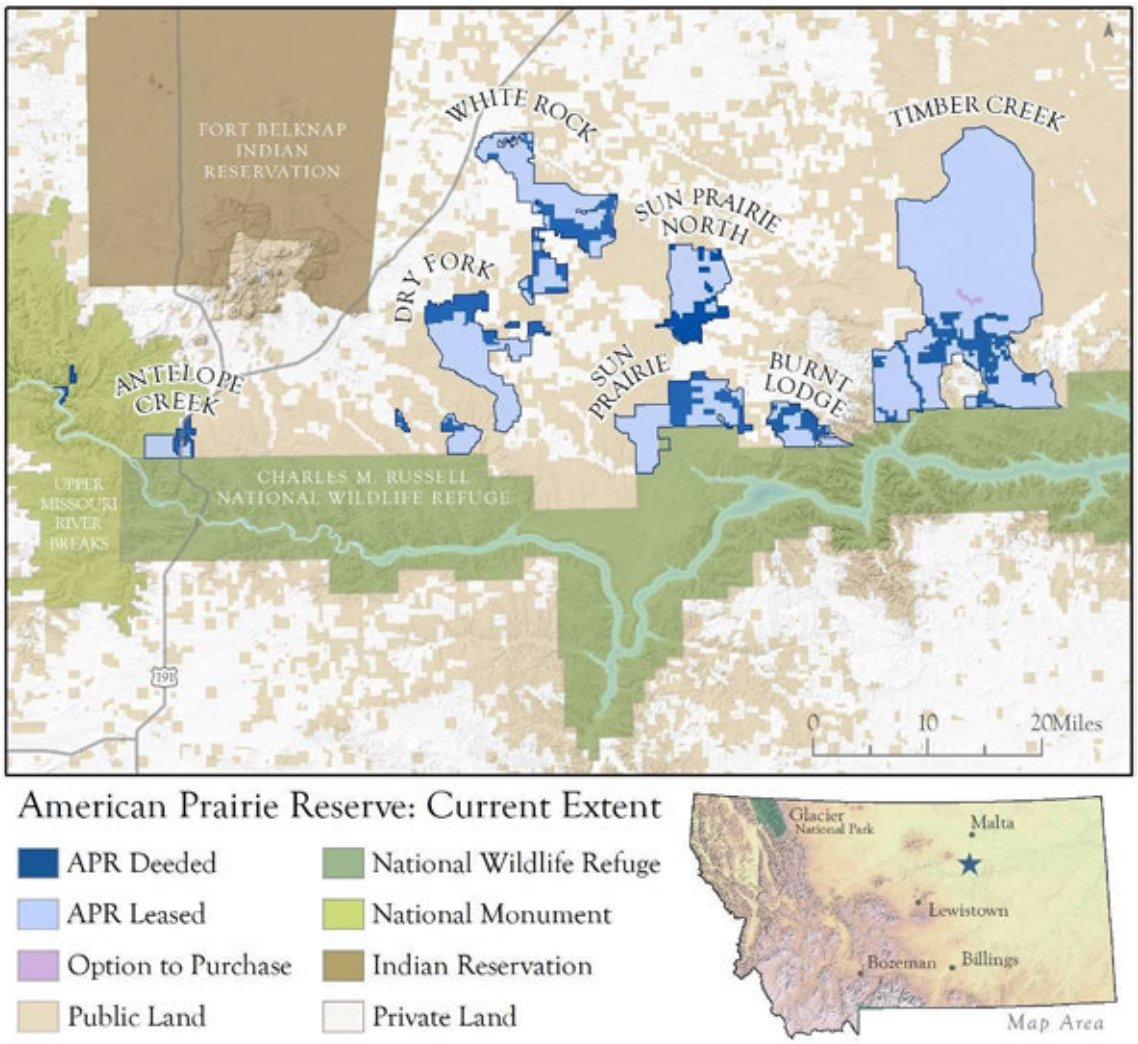

Figure 5. Area of Montana where the American Prairie Reserve is located and where they manage their bison herd, i.e., Sun Prairie section.

Primary Objective(s) for Current Bison Herd: Among APR's primary objectives is to develop one of the largest conservation bison herds in North America and to increase the genetic diversity of that herd. APR manages its current livestock bison herd in order to restore natural prairie ecological processes. The mission of APR is to create and manage a prairie-based wildlife reserve that, when combined with public lands already devoted to wildlife, will protect a unique natural habitat, provide lasting economic benefits, and improve public access to and enjoyment of the prairie landscape. APR notes that its goal is to reach 1,000 bison by 2018.

Ownership of Bison: APR owns the bison on site. The bison are classified as domestic livestock.

Jurisdiction/Agency Responsibilities: APR currently has sole authority over their domestic bison herd. When bison are grazing on private APR lands there is no cooperating land management agency. The Bureau of Land Management (BLM), Department of Natural Resources Conservation (DNRC) and the Charles M. Russell National Wildlife Refuge (CMR) have habitat management authority over the public land allotments where APR bison graze for portions of the year.

Herd Details and Management of the Herd on Site: In 2005, APR began to develop a private bison herd on the reserve. The herd began with 16 bison that were imported from Wind Cave National Park. Through natural growth and additional imports from Elk Island National Park, the herd has increased to 440 animals in 2014. The 2015 spring calf crop is estimated to be around 130 calves.

APR has augmented its herd with mixed ages and sexes to speed growth when deemed necessary. APRs management approach fosters a 50:50 sex ratio.

APR operates under a management plan created with bison experts and scientists with the World Wildlife Fund. APR strives to manage its herd with as little human interaction as possible while still meeting the required grazing guidelines when the herd is on BLM or state land. Handling of the bison is conducted only as needed for marking, disease monitoring, or research purposes, e.g., radio telemetry collar deployment. APR does not provide supplemental feed in the winter except in very rare cases where snow has temporarily buried border fences and there is a risk of the bison leaving the reserve and entering neighboring property.

APR's bison herd currently resides within 31,000 acres of the Sun Prairie portion of the reserve (see map). APR has removed over 45 miles of interior cross fencing in order to allow bison to graze unencumbered. As the herd grows, APR will expand the land base upon which bison graze.

APR conducts research on the reserve to gain a better understanding of bison and prairie ecological processes (Kohl et al., 2013). APR is working with researchers to track bison movement and observe grazing patterns within the reserve through the use of radio collars. Adult cows are currently the only animals radio marked. APR recently teamed up with 'Adventurers and Scientists for Conservation' to develop volunteer monitoring studies on the reserve. The monitoring effort provides information on range conditions and wildlife presence.

APR does allow public hunting, although it does not currently allow public hunting nor use public hunting as a management tool for its bison herd.

As domestic livestock, APR's current herd is maintained as a captive herd within wildlife friendly fences. APR has been experimenting with new fence designs to accomplish their objectives and those of their neighbors. In most instances their fences are no more than 45" high and no lower than 18" off the ground and include a high voltage hot wire. Through an intensive camera trapping effort led by researchers on the reserve, APR is gaining more insight as to how different wildlife species are interacting with this fencing. Preliminary results indicate pronghorn, white-tailed deer and mule deer move freely through this fence. A small sample size of elk fence crossings reveal elk jump over or through the fence (K. Kunkel, APR, pers. comm., 2015).

Fence diagram

Figure 6. Diagram of APR's current fence design used to contain their bison.

APR historically tested all animals annually for disease. The current approach is to test at least 20% of the animals on site. Blood samples are acquired through tranquilizer darting in the field rather than herd round ups. No augmentation animals are brought in without being fully tested for reportable diseases. Testing to date has not revealed any diseases of concern within the herd. Aside from the vaccines and testing required during new bison acquisitions, APR does not vaccinate or medicate any of its bison. In the event of a serious communicable disease outbreak, APR notes it would use any means necessary to protect the long-term health of the bison herd and to protect the other private livestock operations in the area.

Any bison found off the management area and not successfully hazed back by APR within 48 hours can be lethally removed by a private landowner. Since initiation of this project, lethal removal has been conducted twice under these circumstances. Hazing with a helicopter was conducted once during extreme deep snow conditions (S. Gerrity, APR, pers. comm., 2015).

Management considerations that must be evaluated for source herds to supplement APR bison include the disease status of the herd, the origin of the herd's founding animals, the level of cattle introgression present, and the management regime the herds are habituated to. APR tests each bison that enters the population for cattle gene introgression using Single Nucleotide Polymorphism (SNPs) technology. To increase allelic diversity, APR plans to begin importing bison from other sources in the future, provided that every imported animal tests negative for cattle introgression. As the herd increases, APR plans to begin

shifting focus from growing the population for the preservation of genetic diversity to increasing that genetic diversity through supplementation from various and diverse herds.

Size and Habitat of the Restoration Area: APR currently owns and/or leases more than 305,000 acres of deeded and public land. Additionally, the ranches APR has purchased have historically held grazing privileges on more than 63,000 acres in the Charles M. Russell National Wildlife Refuge. Currently APR holds 25 AUMS within the CMR on lands that are directly adjacent to APR lands. The bison are allowed to cross this jurisdictional boundary. The U.S. Fish and Wildlife Service policy is to use various management tools on these Refuge lands, including resting habitat units, to promote healthy plant and wildlife habitat conditions.

APR will continue to purchase strategic private lands that can be linked to existing public lands in order to provide the best possible habitat for wildlife. APRs goal is to purchase private land across a broad area in order to reduce habitat fragmentation and enable the area's wildlife to range unimpeded in a large landscape. This approach is particularly beneficial to animals that undertake far-ranging migrations each year, such as pronghorn. By placing deeded lands into conservation easements over time, APR seeks to ensure the conservation of this land in perpetuity. APR generally does not cultivate nor build on its properties with some exceptions such as the newly constructed Enrico Education and Science Center.

The APR consists primarily of shrubland, steppe, and savanna habitat but also includes some riparian and wetland sites.

Ecological Interactions: Livestock bison on APR and public lands interact with native ungulates and other native prairie species. APR's approach to biodiversity restoration is built around the *Freese Scale for Grassland Restoration*. This scale can be used by land managers trying to achieve a balance between agricultural production and biodiversity as well as those, like APR, which are solely focused on maximizing native prairie biodiversity (Fresse et al., 2014). The Freese Scale is a 7-point scale that evaluates land management based on 10 ecological conditions that have been most effected by human activities. At one end of the scale is commodity management, which describes activities like grain or cattle production that are common in the APR region. At the other end of the scale is biodiversity management, which represents ecological conditions that would be in place when biodiversity conservation is the primary goal for the land. The result is a scale that tracks the effects of different management decisions on ecological conditions, providing APR with a tool to assess progress as it transitions land from a primary focus on livestock and grain production to a focus on biodiversity. Over 150 species of birds use the APR and the reserve is part of an ongoing study assessing the impact of bison grazing on bird diversity. APR deeded land supports a variety of other wildlife including prairie dogs, pronghorn, and big horn sheep.

Historical Presence of Bison: This portion of Montana is within the species' historical range. The APR was a site that historically had a high density of bison. The historical

occupation of bison within the region is preserved in the numerous skeletal remains and horn sheaths that are still present in the region (Knowles, 2001).

Current Uses of the Restoration Area

Recreation: APR has developed a recreation experience that is free and open to the public. APR offers opportunities for hiking, horseback riding, biking, camping, bird watching and hunting. APR's domestic bison are able to roam in all areas of the current occupied unit including public campgrounds and all viewing and hiking areas. To date, there have been no bison-human conflicts. There are interpretive and science education signs on the Reserve to improve visitors' experiences by providing information on topics such as wildlife and regional history.

APR is supportive of hunting and has enrolled a large portion of its deeded land in FWP's Block Management program to allow public hunting. Bison roam in parts of these Block Management Areas. Two parcels managed by APR have conservation easement-access agreements with FWP. Another parcel is under easement with the Montana Land Reliance. A key tenet of the APR mission is public access, and thus APR plans to maintain access for a variety of public uses. Both the public and private lands that comprise APR will be managed to provide a quality outdoor experience for the general public.

Grazing Agriculture: Livestock currently use portions of APR lands. Livestock stocking and grazing management decisions are at the discretion of APR and the appropriate land management agencies. Range assessments are conducted to ensure current cattle and bison stocking rates are compatible.

APR and WWF conducted a joint study, funded by the Murdock Foundation, comparing the movements, landscape use and ecological impacts of the APR bison herd on neighboring cattle herds. APR has also partnered with University of Montana graduate students and WWF to conduct a comparative study of bison and domestic cattle water use. GPS radio collars were placed on both species in order to accurately monitor their respective movements and ecological impacts at both APR and Grasslands National Park, Canada (Kohl et al. 2013). Bison and cattle differed in all behaviors such as grazing, standing, bedding and moving. Cattle spent a higher proportion of time grazing (45–49%) than bison (26–28%) and increased time at water. Bison moved at a 50–99% faster rate than cattle. Cattle selected for high plant biomass, whereas bison selected for intermediate plant biomass.

Socio-Political Environment: There is already a great deal of landowner and local community concern about changes in landownership in northeastern Montana, changes in federal programs such as a possible National Monument designation, reduction of livestock grazing on the CMR, changes in water rights, and state programs such as the transfer of quarantine bison to Fort Peck. A recent study of perception of land use changes in Phillips County found three main sources of conflict in the region stemming from: 1) the recent growth of APR; 2) the recent changes in federal land management that are reflective of shifting state and national priorities on conservation; and 3) differing perceptions of what constitutes prairie conservation (Raicovich, 2012).

Phillips County, where the majority of APR properties are located has a resolution (2015) against FWP or the USFWS translocating bison into the county and another resolution (2010) declaring all bison within the county to be considered livestock. A smaller portion of APR lands fall within Valley County borders where the Conservation District passed an ordinance calling for a permit in order to authorize grazing of bison in the district for the protection of soil and water resources. A number of counties in eastern Montana have passed ordinances to prevent any bison translocations into their counties without local government approval. Bison present on APR lands at this time are classified as bison.

As of 2013, APR had spent $24.5 million in the local community, including land purchases, tourism, equipment, supplies, payment to contractors, wages for local staff, real estate tax, and other reserve management costs. In 2013, local spending excluding land payments totaled $1.2 million. APR pays real estate taxes on all of its deeded lands as well as taxes on personal property. APR is now one of the top tax payers in Phillips County.

Skepticism towards this project was originally high from surrounding landowners. Detailed agreements were secured between APR and landowners to ensure 'good neighbor' practices were maintained relative to herd containment, disease management, etc. Since the first five years of project implementation the need for these agreements has become less and in many cases unnecessary altogether (S. Gerrity, APR, pers. comm., 2015). However, mistrust and skepticism remain among other landowners in north central and northeastern Montana as evidenced by editorials and documentaries on APR that try to describe both sides of the issue.

Landowner Incentives: There are currently no landowner incentive programs pertinent to this case study as APR is the landowner and the owner of the bison.

Reduced Risk of ESA Listing: While the current bison herd is large enough to likely be genetically viable it is classified and managed as livestock and therefore is not pertinent to a listing decision for wild bison.

Funding/Costs: Trackable costs to manage the bison herd on APR indicate a total annual cost of less than $50,000. APR staff that manage the bison herd have other duties on the preserve and some staff such as the lead scientist work only part time on bison related projects. Start up costs to initiate the program were considerably more but the current hands off approach to herd management is much less. Extreme weather conditions requiring herd hazing or research projects for herd monitoring result in costs not considered annual expense (S. Gerrity, APR, pers. comm., 2015).

3.5 Alternative #3: Restoration of a Publicly Managed Bison Herd on Tribal Lands

A tribal entity would be identified who is willing to negotiate with FWP through an MOU for specific management responsibilities of publicly managed bison. Tribal sovereignties and culture would be respected and bison would be restored to Indian Country providing opportunities to restore and strengthen cultural connections to bison. Bison hunting and viewing access would have to be allowed within tribal lands boundaries. Implementation of this alternative could be done at various scales, i.e., small or large herd. Implementation at any scale would follow the guidelines above.

Bison would interact with existing native wildlife and ecological processes. Agreement between FWP and the tribal entity could specific direction about land management activities. Hunting for tribal and non-tribal members would have to be allowed. Hunting program details would have to be agreed upon by FWP, tribal entities and a citizen working group. FWP and the tribe would have to clarify if any financial incentives for allowing public access would be appropriate or desired. Cultural benefits from tribal hunting would include consumption of bison and revenue sharing.

Livestock stocking and grazing management decisions would be at the discretion of the tribe. All bison moved to tribal land would have to be certified free of reportable diseases as determined by the MDOL and state veterinarian. Disease monitoring and response protocol for potential disease outbreaks would be coordinated by MDOL and state veterinarian and followed by tribal landowner.

A piece of land large enough to support an initial release of 40 bison would be sought. The tribal landowner(s) would be held to managing their land to the best of their ability to maintain the herd within agreed to MOU terms (catastrophic events notwithstanding.) Herd composition and population goals appropriate to the site would be determined by FWP, tribal entity, and a citizen work group. The herd plans would have to be in accordance with Montana and tribal laws. Habitat assessments would be negotiated within the MOU terms to address range capacity on an annual basis including all seasonal use.

3.5.1 Case Study #1 for Restoration to Tribal Lands: Tribal Herd in the Book Cliffs Wildlife Management Unit, Utah

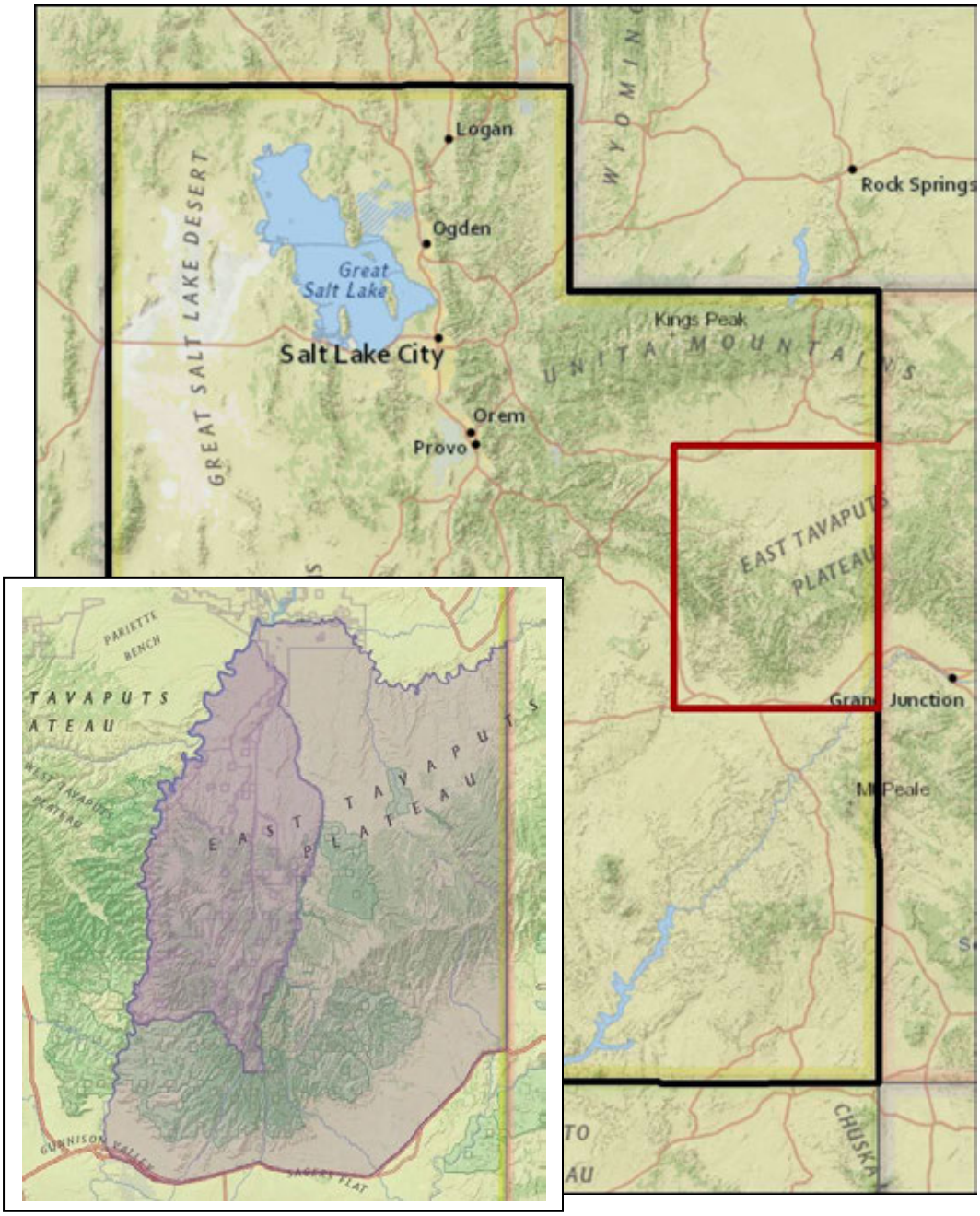

Figure 7. Area of Utah where the Book Cliffs bison herd is managed. The tribal herd is managed within the darkest shading which represents the Uintah and Ouray Reservations.

Primary Objective(s) for Bison: The Book Cliffs bison herd is managed for long term population persistence, genetic conservation, as a source for other conservation

populations, and for hunter harvest (DOI, 2014). The herd consists of two populations or sub-herds. The sub-herds are managed to some extent as separate entities based on the area of use and 'ownership' of the bison. The sub-herds include a public herd that resides primarily on public land and a tribal herd that resides primarily on tribal land.

Ownership of Bison: Bison on the Uintah and Ouray Reservation are owned by the Ute Tribe and classified as wildlife. Bison on the public lands of the Book Cliff Wildlife Management Unit are classified as wildlife and managed by the state of Utah.

Jurisdiction/Agency Responsibilities for the Tribal Herd: The Ute Tribe has jurisdiction and management responsibilities for any Book Cliffs bison found on tribal lands. The Book Cliffs public bison herd is managed by the Utah Division of Wildlife Resources (UDWR). The public bison herd moves between public land and the Ute Tribal land and tribal bison move to the public herd area as well. As bison move between public and reservation lands, the management of the bison shifts between the UDWR and the Ute Tribe (D. Mangus, UDWR, pers. comm., 2014). The BLM and the School and Institutional Trust Lands Administration (SITLA) also have cooperative jurisdiction due to the public lands within the area. The Federal Land Policy and Management Act of 1976 gives BLM the authority to manage non-wilderness lands for multiple uses including fish and wildlife conservation but the state retains jurisdiction over managing resident wildlife populations.

Herd Details and Management of the Herd on Site: The tribal herd was initiated with the reintroduction of six bison onto the Uintah and Ouray Reservation in 1986 (UDWR, 2007a). Through additional introductions from a variety of sources in addition to natural growth the herd has grown to 800-900 animals as of 2011, though the stated objective is 450 bison (DOI, 2014). The tribe manages the population through hunting permits.

The UDWR implemented the Book Cliff's Conservation Initiative in the 1990s. Initiative lands were secured through private land purchases in cooperation with the Rocky Mountain Elk Foundation and The Nature Conservancy. These lands and the associated grazing permits were made available for wildlife conservation purposes. Some of the grazing privileges were shared with surrounding landowners as encouragement for them to adjust their own grazing practices to enhance wildlife habitat. In 2006, following the movement of tribal bison onto these public lands, the North Book Cliffs Bison Planning Committee (committee) was created to examine the potential of reintroducing a public herd to the Initiative lands. The committee was made up of a diverse collection of public agencies, private landowners, and interest groups (UDWR, 2007a). The committee established management goals and reintroduction plans. The state herd was established in 2009 with 44 bison (30 from the Henry Mountains, 14 from Ute Tribe Trust Lands) and was supplemented in 2010 with 40 more bison from the Henry Mountains (DOI, 2014). The public herd is currently around 140-150 animals. These animals were hard released on site and have remained in the area of that release.

During the summer grazing season the public and tribal herds are generally separated onto the respective land management units. During the winter months, the public herd typically grows by 200-300 bison as tribal animals move to public lands. While mixing is the result

of unfenced bison herds, some fences do exist in the area to manage livestock movement. Generally, distribution and abundance of the herds is maintained by a combination of tools with hunting and hazing being the primary ones.

The UDWR has developed a cooperative agreement with the tribes in order for the tribe to have some hunting privileges on the public land, in addition to the tribal lands. The tribes receive 25% of any permits issued by UDWR to use on lands which were once included in the reservation.

All bison moved to the area were tested for brucellosis, tuberculosis, and trichomoniasis before transfer to the Book Cliffs. No evidence was found of any of these diseases. When the public herd population reaches the appropriate level to allow for hunting, hunter test kits will be used to monitor the herd for disease. UDWR will continue annual disease testing through capture efforts with a minimum of 15 cow bison captured and tested annually for brucellosis (DOI, 2014). As of 2015, no diseases of concern have been identified with the public herd (D. Mangus, UDWR, pers. comm., 2014). Annually the tribes round up and test 300-400 bison for disease exposure. To date no diseases of concern have been identified.

Some genetic testing of bison was completed before bison were brought from the Henry Mountains. No cattle introgression was noted in these animals. The source bison for much of the tribal herd were from animals that do have low levels of cattle introgression (DOI, 2104).

Size and Habitat of the Restoration Area: The Book Cliffs Wildlife Management Unit (BCWMU) consists of approximately 2.1 million acres within Utah's Uintah and Grand counties, which are managed as BLM lands, Native American Trust Lands, and State of Utah Trust Lands. The BCWMU is divided into three subunits. The Book Cliffs bison herd is managed on the Bitter Creek and Little Creek subunits, which consist of approximately 1.47 million acres, of which 5% is private land, 35% is Ute Tribe Trust Land, and the remaining 60% is BLM, UDWR, and State Trust Lands (UDWR, 2007a). The region of the BCWMU containing the bison herds varies in elevation from 7,500 to 9,000 feet, and is part of the arid Colorado Plateau ecotype consisting of pinyon-juniper shrub-steppe habitat. The vegetation consists of oak brush and sage, with some aspen and conifers (D. Mangus, UDWR, pers. comm., 2014).

Ecological Interactions: The bison share the range with multiple native ungulates, including elk, mule deer, and pronghorn (DOI, 2104). The state uses prescribed fire, mechanical treatments, and reseeds burned areas to improve habitat for grazers. The habitat changes in the area are not directly attributable to bison, but are a result of long-term use of the area by a variety of animals and domestic livestock. The annual budget for habitat improvements within the Book Cliffs has been $400,000-500,000 per year since bison introduction. Additionally, $80,000-100,000 is spent on tribal land habitat projects each year. Not all of the projects are specifically directed at bison, but many of the projects benefit bison as well as the other species. This area is a high priority area for habitat improvement for both deer and elk populations. The state has not reduced hunting tags for

any other species as a result of the presence of bison, nor have species populations decreased due to the presence of bison.

Historical Presence of Bison: The Tavaputs Plateau northeast of the Book Cliffs is within the historical range of Plains Bison but probably did not sustain high population densities due to the lack of water, a short growing season, and dense forest (DOI, 2014). Evidence that bison were found in the Book Cliffs area historically has been identified through fossil records and bison skulls located in the area (Book Cliffs Management Plan, 2007).

Current Uses of the Restoration Area

Recreation: Bison can be viewed and accessed from public roads throughout the Book Cliffs area. About 200 tribal bison are harvested annually on tribal lands by tribal and non-tribal members. Permits for non-tribal members are auctioned with proceeds of about $2,500 per permit used to fund tribal schools and scholarships. The management plan for the public herd calls for public hunting to be the principal population management tool, though it is believed that drought will impact reproduction rates (UDWR, 2007a). The management plan states that if bison move beyond the BCWMU, they may be considered nuisance wildlife (UDWR, 2007a). A limited harvest has been undertaken to remove bison from a temporary range that extended to agricultural lands outside the Book Cliffs (DOI, 2014); 25 permits were issued and 23 animals were taken during this hunt in 2014. Depredation hunts will continue to be used to manage distribution as hunting pressure by state and tribal hunters can be targeted in problem areas when needed.

To date there have been no human safety issues. Recently a gravel county road has been paved that traverses the Book Cliffs area. The state and others are actively assessing how to address wildlife crossing issues associated with this road.

Grazing/Agriculture: There is overlap between the range use of bison, cattle and sheep as private grazing allotments are still maintained on the BCWMU (DOI, 2014). There are no sheep on tribal lands but cattle and feral horses are present. In the North Book Cliffs area where the publicly managed bison spend the majority of their time, there are two livestock operations that run 1,000-1,500 cow/calf pairs. Sheep are grazed at lower elevations on the far northern and southern ends of the public lands with little overlap with bison. There have been no complaints of livestock fence damage from the bison. Fence damage that does occur is often attributed to elk in the area.

The UDWR, with the help of the committee and sporting groups, completed cooperative range and habitat improvement projects on approximately 114,555 acres of primarily public land between 2002 and 2007, and plans to continue to implement range improvement projects (UDWR, 2007a). The UDWR and sporting groups have also purchased lands and made those grazing allotments available to wildlife, including bison (D. Mangus, UDWR, pers. comm., 2014). This has reduced the conflict between bison and livestock.

UDWR works with landowners and third parties to resolve conflicts that develop between bison and livestock interests (DOI, 2014). Water availability is the biggest concern (DOI,

2014) and the UDWR committed to local landowners that it would assist with water development to address concerns. The UDWR, together with sportsmen and women, and livestock producers have worked on water development in the area. The BLM and UDWR have used funding from bison conservation permit dollars to assist with these developments on public lands.

Socio-Political Environment: Support from both tribal entities and hunters has been noted for bison programs in the area. There have been concerns over some aspects of management, most notably, how to allocate damage hunt permits. A cooperative agreement to resolve tension over this issue was developed and is under consideration by the tribes.

During initiation of this program there were concerns regarding lost grazing privileges, conflicts between bison and livestock, and human safety. The North Book Cliffs Bison Planning Committee examined the potential for reintroducing a public herd to the region while minimizing conflicts. The committee established management goals and reintroduction plans and worked closely with landowners and grazing permittees in the area to minimize conflict.

Landowner Incentives: Incentives to the tribal entities with the tribal herd include a re-connection with a native species and hunting opportunity on tribal lands. Additionally, the cooperative agreement between UDWR and tribes resulted in additional hunting opportunity for tribal members on public land. The tribes receive 25% of any permits issued by UDWR to use on lands which were once included in the reservation. Culling of the tribal herd to control population growth may provide financial incentives to the tribal entities if a market can be secured for the bison.

Private landowners within the area are eligible for UDWR funded habitat improvement work on their lands. Landowners are also eligible to participate in Utah's program that allocates deer, elk, and antelope tags to landowners that can be sold to hunters for private profit. Any profit from the sale of tags must be used to cover damage from wildlife before a landowner could seek compensation from the state.

Reduced Risk of ESA Listing: As some of the source bison for this program came from herds with some level of cattle gene introgression these animals would likely not be considered in ESA listing considerations.

Funding: This restoration effort is funded with a combination of state, tribal and public funds. The track-able annual costs for bison management by the tribes is around $100,000. As stated previously there is significant spending on habitat projects. These projects, however, are not solely attributed to bison management. Specifically, $80,000-100,000 is spent on tribal land habitat projects each year. Much of the staff time for management, monitoring, and other activities are included in the day to day general wildlife duties of UDWR staff. When feasible, bison are monitored along with elk, deer and other wildlife. Every three years the UDWR collects a complete inventory of bison but this information is gathered in conjunction with elk monitoring.

3.6 Alternative #4: Restoration of a Publicly Managed Bison Herd on a Large Landscape Where there are Minimal Conflicts with Livestock (Large Herd Alternative)

Bison would be restored to a large landscape in Montana where there is minimal competition with livestock; either the area has not had domestic livestock allotments, the allotments are no longer active, or there are minimal allotments. Bison herd size would be determined by range capacity with a conservative stocking rate. Implementation of this alternative would be at a large scale. The difference between #2 and #4 is the idea of program size and the level of competition with domestic livestock. This alternative would be implemented on a large scale to restore a herd of more than 400 bison in an area where livestock conflict is minimal. An initial soft release of 40 animals could be used to start this restoration effort. Restoration on a large landscape could make management and/or response to problems more complex.

Agreements between FWP and private/public/tribal landowner(s) could include specific direction about land management activities. The project should provide noticeable ecological benefits and bison would have the ability to interact with existing native wildlife. Hunting could be used as a management tool and should offer maximum opportunity for public and tribal hunters. Hunting program details would have to be agreed upon by FWP, landowner(s), and the citizen working group. No loss of grazing would be anticipated but is possible depending on willingness of the landowner(s). Forage analyses would be needed (§87-1-216 MCA).

3.6.1 Case Study #1 for Restoration to a Large Landscape Where there are Minimal Conflicts with Livestock: Canada's Pink Mountain Herd

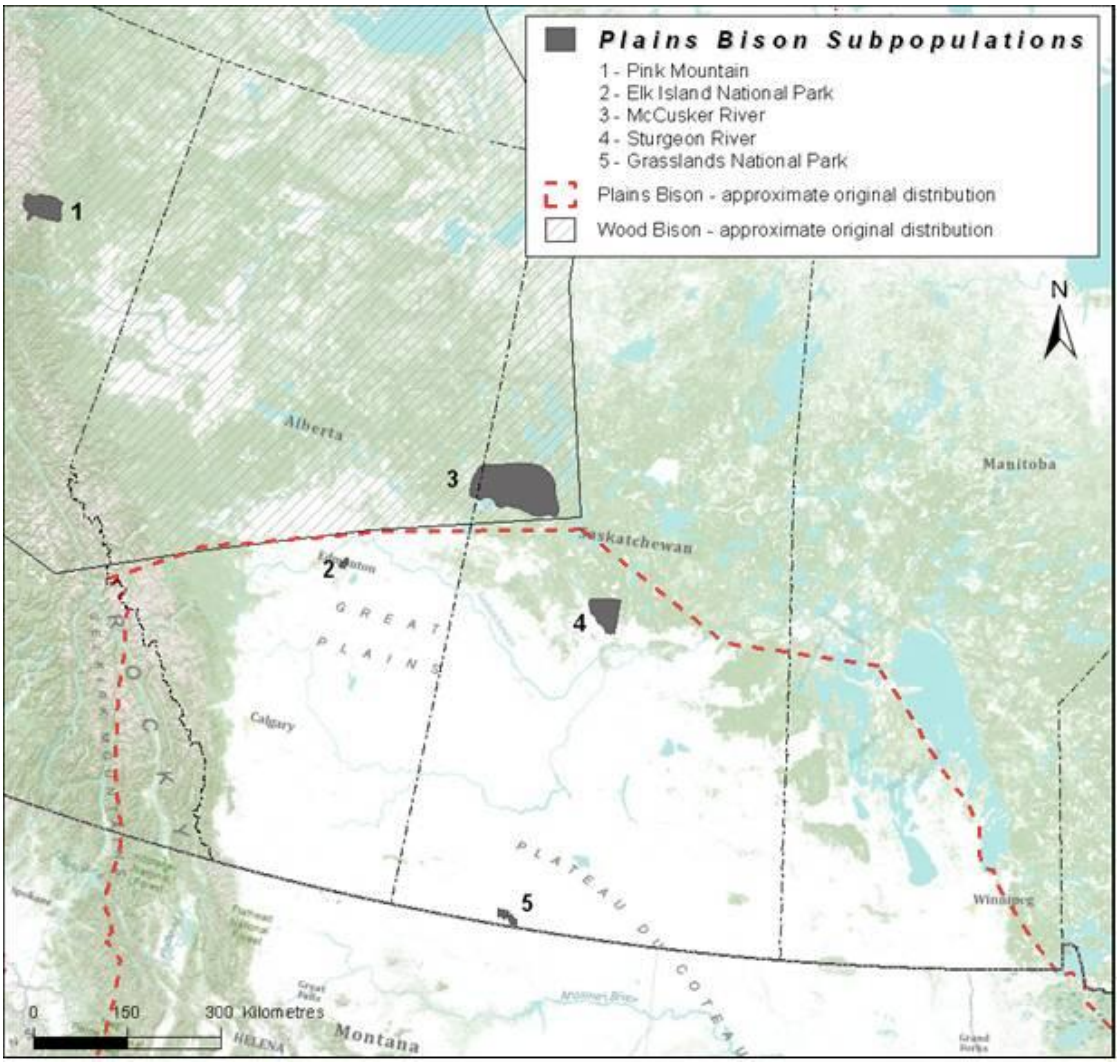

Figure 8. Area of Canada where the Pink Mountains bison herd is managed, i.e. #1 in the far northwest corner of the map, British Columbia.

Primary Objective(s) for Bison: This herd was established through an unintentional escape of domestic bison. Regardless, the objective for this herd now is to maintain hunting opportunity while minimizing range expansion. This herd has expanded in the past and numbers and distribution are now managed through hunting. The numerical objective is 1,000-1,200 animals based on estimates of what the range could support.

Ownership of Bison: The bison are managed by the Provincial government and under public ownership.

Jurisdiction/Agency Responsibilities: The Plains Bison of the Pink Mountain herd are managed at the provincial level by the British Columbia Ministry of Forest Lands and

Natural Resource Operations. The herd is located within Treaty 8 territory. Management is coordinated with Treaty 8 First Nations (collaborative management) but final authority stays with the Province.

Herd Details and Management of the Herd on Site: This herd was established in 1971 when 48 privately owned Plains Bison originally purchased from Elk Island National Park escaped (COSEWIC, 2013). Since the captive herd escape, the population has grown substantially with the 2014 inventory finding a total of 1,020 animals including 629-699 mature adults (COSEWIC, 2013). The population has declined slightly from the 2006 inventory of 1,302 bison due to aggressive, liberal hunting and predation. The harvest target rate was adjusted from 10% to 16% after the 2006 inventory (COSEWIC, 2013). The herd is managed to control population growth and range expansion, given its proximity to Wood Bison subpopulations in northeastern British Columbia. The Pink Mountain herd is the most demographically robust unit of Plains Bison in Canada (COSEWIC, 2013).

These bison are not fenced nor contained in any way. They exist in a special management area with their distribution being controlled primarily through hunting and some minimal hazing. Future plans are to continue this approach to avoid the chance of contact with Wood Bison and domestic bison in other parts of the province. There was initially a drift fence on the perimeter of the area to encourage bison to avoid some limited private lands. The fence has not been maintained.

There were animal exclosures established after an initial range survey in 1993 to monitor forage use by bison and other wildlife in the area however these have been only sporadically monitored. There are some areas where bison are having a negative impact on the range due to population numbers and grazing practices (Alicia Woods, pers. comm., 2014.)

Currently there is no disease testing program for this herd but there is no evidence that these animals have been exposed to any diseases of concern (COSEWIC, 2013). As the source bison for this herd came originally from Elk Island, a herd free of cattle gene introgression, these animals are considered free of introgression as well.

Size and Habitat of the Restoration Area: The herd ranges in a 3,200km^2 area in the upper Sikanni and Halfway river valleys that are mostly 'Crown' lands or public land (COSEWIC, 2013). The habitat consists primarily of sedge meadows and grasslands.

Ecological Interactions: The herd is subject to a full range of natural ecological processes, including disease and native predators (COSEWIC, 2013). Wolves are the main predators of northern bison, but bears and wolves both prey on bison calves (British Columbia Ministry of Environment, Lands and Parks, 2000). The area that is occupied by bison also contains moose, elk, stone sheep, goats, caribou, mule deer, and white-tailed deer. To date, conflicts between these species have been minimal with the exception of stone sheep conflicts. Bison use alpine areas that are blown free from snow when deep snow or environmental conditions in other places force them to seek open ground. Stone sheep and possibly caribou also use these windblown areas resulting in competition among the species. There

has been a program to distribute salt to lower elevations to encourage bison to avoid the alpine areas but these lower elevations are used by wintering elk. Winter range for elk is currently not a limiting factor but could be in the future depending on population levels.

Historical Presence of Bison: This herd is outside the historical range of Plains Bison but is located in the original range of Wood Bison (COSEWIC, 2013).

Current Uses of the Restoration Area

Recreation: Hunting, fishing, outdoor recreation, snowmobiling, and ATV use occur within the herd area. The population size and distribution is managed through regulated hunting to confine it within a management area and target population range (COSEWIC, 2013). This program produces license revenue to support management programs, plus meat for successful hunters (British Columbia Ministry of Environment, Lands and Parks, 2000). Approximately 300-550 permits are issued annually depending on the status of the population. The target harvest rate has been maintained at 16% of the population in recent years in order to reduce numbers. Overall hunter success ranges from 30-40%. Hunts are segmented into two-week intervals to distribute hunting pressure. Bison have responded to hunting pressure by changing their distribution to areas where the season has closed and by avoiding humans. Currently there is a shared permit system to lessen hunter congestion. Under this system a group of four hunters are allowed to harvest two bison with any of the permitted individuals in the party allowed to kill the animal.

Salt blocks are used in the winter to encourage bison to stay off the highway (COSEWIC, 2013). The range where this herd resides does receive use by off highway vehicles and snowmobiles and, as it is hunted, it may be more sensitive to disturbance by vehicles and human presence (COSEWIC, 2013).

Grazing/Agriculture: There is a domestic bison herd in the general vicinity of this population (COSEWIC, 2013). The only livestock located in the area are horses associated with a guide/outfitting operation. There have been conflicts between bison and horses when horses were being fed or were at salt stations. This situation was addressed by changing some livestock management practices as well as hazing bison from the area of conflict.

Private and Public Land Use: A limited amount of resource extraction activities including logging, oil, and gas extraction occur in the area. There is very little private land in the area. There have been minimal conflicts with these uses in the area as the area is very remote with limited access. Some buildings on private land have been fenced to deter bison.

Socio-Political Environment: The bison are supported by the hunting community. Drawing a permit to hunt bison in this area is very difficult with the odds of success being only 25-30:1.

Landowner Incentives: The Provincial Department of Agriculture has some programs to minimize wildlife damage, i.e., stack yards. However, because so few livestock use this area

there has been limited use of these programs. There was a stack-yard fencing project on private land to exclude bison from stored hay and there was also a drift fence established on the margin of the management area to encourage bison to avoid private lands on the edge of the management area.

Reduced Risk of ESA Listing: This population is the largest free ranging Plains Bison population in Canada. Because there are very few other Plains Bison populations, the COSEWIC assessment of the status of Plains Bison in 2013 recommended a threatened status for this animal in Canada.

Funding: There are habitat maintenance programs in this area that use prescribed burns to benefit wildlife in general. This maintenance program costs about $100,000 (CAD) annually with approximately $10,000 (CAD) directed specifically at bison habitat every 2-3 years. The salting program is currently unfunded, but costs between $5,000-10,000 (CAD) per year when active. The inventory costs for population assessment in 2014 were $40,000 (CAD).

3.6.2 Case Study #2 for Restoration to a Large Landscape Where there are Minimal Conflicts with Livestock: Alaska's Wood Bison Herd

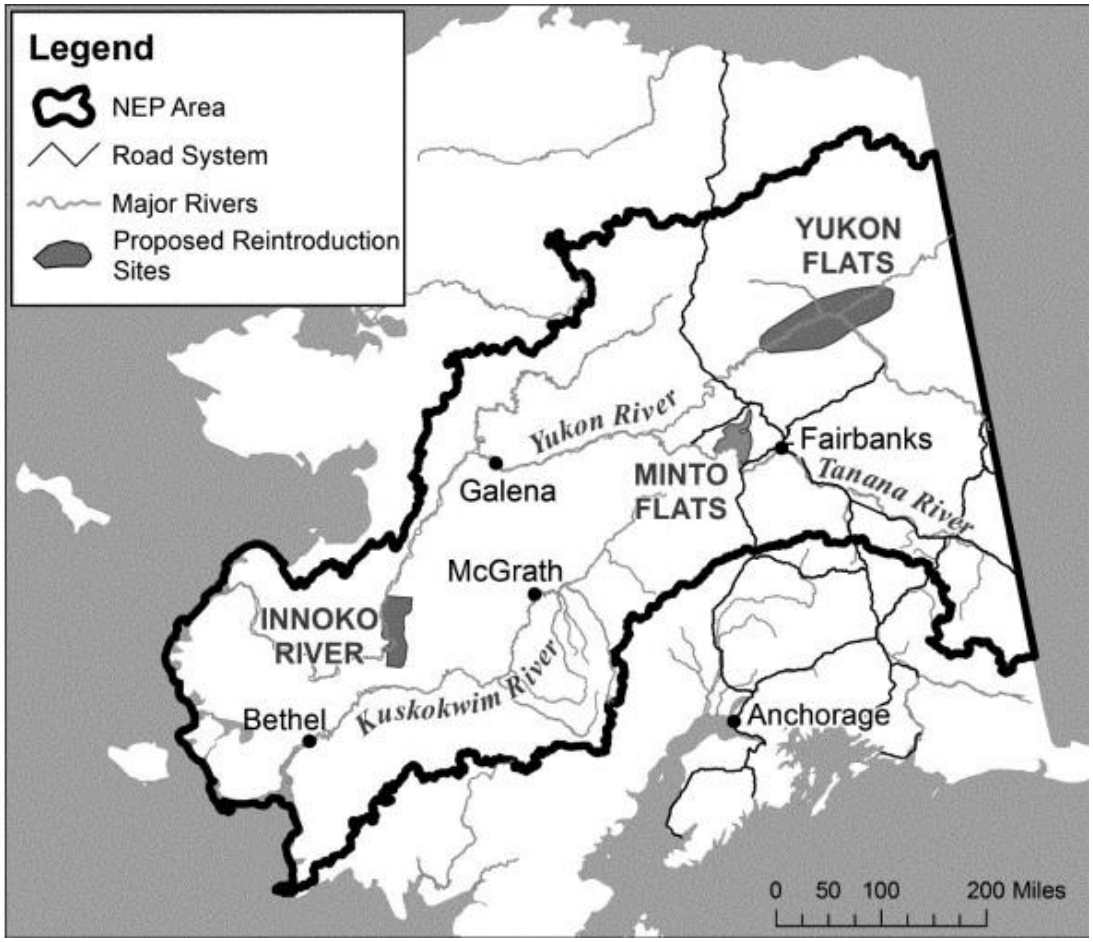

Figure 9. Area of Alaska depicting the overall Nonessential Experimental Population (NEP) area as well as the three proposed restoration areas for Wood Bison.

Primary Objective(s) of Bison Program: The goal of the Alaska Wood Bison restoration project is to establish one or more free-ranging populations within the state. Restoration would be followed by a long term monitoring and evaluation process to determine feasibility of establishing additional populations (50 CFR Part 17). The objectives of the Alaska reintroduction effort include; (1) restoring a key indigenous grazing animal to northern ecosystems; (2) restoring biological and habitat diversity and natural processes; (3) increasing the total number of Wood Bison in free ranging, disease-free herds, thereby enhancing the overall survival of the species in the wild; (4) providing a regulatory framework that allows for sustainable development, including opportunities for local tourism, hunting and guiding businesses; and (5) re-establishing the historical cultural connection between bison and Alaska residents (50 CFR Part 17). The restoration would also provide an opportunity to monitor the long-term ecological effects of a large grazing mammal as global climate change occurs, possibly shifting northern ecosystems toward grasslands (Alaska Department of Fish and Game, 2013).

Ownership of Bison: Any Wood Bison restored through this program would be managed by the Alaska Department of Fish and Game as wildlife and under public ownership.

Jurisdiction/Agency Responsibilities: The *Final Rule for the Establishment of a Nonessential Experimental Population of Wood Bison in Alaska* directs that the Alaska Department of Fish and Game (ADFG) will have primary management responsibility for leading and implementing a bison restoration project (50 CFR Part 17). The United States Fish and Wildlife Service (USFWS) will coordinate with ADFG on restoration efforts. Site specific management plans will be developed for each area by ADFG with the involvement of landowners and other stakeholders (50 CFR Part 17).

Herd Details and Management of Herd on Site: Bison restoration began at the Innoko River site in 2015. About 100 bison are being used for reintroduction from the Elk Island Wood Bison herd. The ultimate goal is to re-establish wild Wood Bison populations in Alaska with founding animals that are as genetically diverse as possible (50 CFR Part 17). The ADFG evaluated areas that would support at least 400 animals, but recognizes that larger populations are more effective in preserving genetic diversity over the long term. Rather than setting minimum population objectives for each reintroduction area during the development of the EA or the 10(j) rule, ADFG will develop science-based population objectives for each area through public management planning efforts to address site-specific conditions. The hope is that any herd will grow about 20% per year to a population of 400-500 animals; big enough to sustain itself while providing some harvest for subsistence and sport hunters (Mowry, 2014). The areas where reintroductions are occurring and being considered can support populations ranging from about 400 to 2,000 animals (ADFG, 2013). The Lower Innoko/Yukon River site specifically has a potential carrying capacity of more than 400 bison and is the first target area for restoration (ADFG, 2013).

In conformance with recommendations of bison geneticists and conservation biologists, a minimum of 100 captive-raised Wood Bison will be released at a single site within the area in the first year of the program. A similar number may be released at each of two additional sites in subsequent years (50 CFR Part 17). A temporary holding facility consisting of a small corral with a supply of hay will be provided at each release site. Ideally, bison will be transported to the site in late winter or early spring and held for some period to allow them to acclimate to their new location and to ensure that the release date coincides with the emergence of spring forage (50 CFR Part 17). Once the bison are released the temporary holding facilities will be dismantled.

Most of the transplant stock would be young animals, which are easier to transport. Some older cows would be included to help maintain social behavior and protect younger animals from predation. The sex ratio of release animals is to be 1:1 (ADFG, 2013). Experience in managing other bison herds and population modeling indicate that founding populations of at least 40 bison could grow to approximately 400 animals in 10–15 years (50 CFR Part 17). The range use by herds is closely linked with population size and habitat quality. Wood Bison show a strong fidelity to seasonal ranges (ADFG, 2013). A population of about 500 Wood Bison would be expected to remain within an area of 500 square miles

or less (ADFG, 2013). In habitats like those being considered for restoration, bison populations typically do not expand their distribution until population densities reach 1.5-2 bison per square mile (ADFG, 2013).

ADFG, the USFWS, and restoration program cooperators will evaluate the success of each reintroduction effort and apply any lessons learned to subsequent efforts, thereby increasing the efficiency and long-term success of restoration efforts in Alaska (50 CFR Part 17). Biological data necessary for long-term bison management will be obtained from annual spring population surveys, fall or winter composition counts, and the monitoring of herd movements. (50 CFR Part 17). The ADFG will use radio telemetry and satellite collars to monitor bison. If a reintroduction effort fails, or in the unlikely event that litigation changes the legal status of bison, the animals may be removed from the area (Alaska Wood Bison Management Planning Team (AWBMPT), 2015). Forage assessments will be conducted to monitor the impact of the herd on its habitat (AWBMPT, 2015). The herd will be closely monitored and conservatively managed during the initial years to better understand how well the herd adapts to its new surroundings and weather events that will likely include occasional deep snow and flooding (AWBMPT, 2015).

There is currently no plan for containment nor need for dispersal management. Cooperators feel the area contains enough habitat and available forage, to maintain the herd within the target area. While plans are being developed for range land monitoring; details have yet to be specified.

All of the potential source bison have been subject to rigorous disease-testing and are certified as free of diseases of concern (50 CFR Part 17; AWBMPT, 2015). Any bison slated for release would be tested for disease by veterinarians before being shipped from the source herd location and also at a holding facility in Alaska before being released (Mowry, 2005). ADFG will continue to obtain samples for disease testing as opportunities arise in connection with future capture efforts or harvests. In the unlikely event that a disease outbreak posing a significant threat to Wood Bison, other wildlife, or humans were to occur, the situation would be addressed through appropriate management actions, including vaccination or other veterinary treatment, culling, or removal of an entire herd, as described in the EA. (50 CFR Part 17)

Size and Habitat of the Restoration Area: Initially, Wood Bison will be held in a temporary corral, and then released on state or private lands. Following release, bison could roam onto other public or private lands (ADFG, 2013). The Yukon Flats south of the Brooks Range, the Minto Flats northwest of Fairbanks and the Innoko River country in northwestern Alaska are the three sites selected for restoration (Mowry, 2005). The sites have been identified based on intensive evaluations of potential habitat conducted in seven areas in central Alaska between 1993 and 2006. Suitable release sites must: (1) support a minimum population of 400 bison, (2) be separate from areas inhabited by Plains Bison, and (3) not have conflicting land uses such as agriculture (50 CFR Part 17).

Continued concerns about potential management requirements under the 10(j) NEP classification compelled the ADFG to identify the lower Innoko/Yukon River area as the

most appropriate of the three potential release sites to initiate the restoration project. Local communities have strongly supported the idea for at least a decade and no large-scale economic development projects have been identified within the area (AWBMPT, 2015). The Lower Innoko/Yukon River site includes at least 1,300 square miles of bison habitat made up of 51% private, 48% Bureau of Land Management, and 1% state lands (ADFG, 2013).

The Lower Innoko valley is characterized by numerous lakes and semi-permanent wet lands and is drained by the Yukon and Innoko rivers. The Lower Innoko River area is primarily an "open wetlands system, and most water bodies are subject to changes in water levels and chemistry as a result of spring flooding in the Innoko and Yukon rivers". Extensive sedge and grass meadow systems cover 7.6% of the area.

Ecological Interactions: Evidence from Canada and elsewhere indicates that there is little competition between Wood Bison and other species. Similarly, in Alaska, Plains Bison coexist with moose with no evident problems (50 CFR Part 17). ADFG could remove or eliminate any restoration bison if monitoring indicates appreciable harm to other native wildlife; i.e., the introduction of disease or other unanticipated environmental consequences associated with their presence (50 CFR Part 17). ADFG has decades of experience with the Delta, Copper River, Chitina, and Farewell Plains Bison herds. Wood Bison have occupied similar boreal forest ecosystems in Canada for thousands of years, with several reintroduced herds occupying the landscape for recent decades. No significant adverse ecological impacts due to the presence of bison of either subspecies have been documented, suggesting that adverse effects are not likely to occur as a result of Wood Bison restoration (ADFG, 2013). The management plan requires that Wood Bison interactions with their habitat and other species be monitored (AWBMPT, 2015).

Historical Presence of Bison: The proposed restoration sites are within the estimated range of Wood Bison during the last 5,000 years (ADFG, 2013).

Current Uses of the Restoration Area

Recreation: The proposed reintroduction areas consist of state, federal, and private lands in interior Alaska. Reintroduction of Wood Bison would not have any significant effect on recreational activities within the area. (50 CFR Part 17)**.** There should not be adverse impacts to Wood Bison in the Nonessential Experimental Population area from hunting of other species, furbearer trapping, or other recreational activities such as boating, snow machining, off-road vehicle use, camping, fishing, firewood cutting, berry picking, or logging. (50 CFR Part 17).

Regulated harvest is considered one of the primary management tools for conservation of the species (50 CFR Part 17). Regulated bison hunting has been used to: (1) maintain herd size within the carrying capacity of the landscape; 2) reduce the potential for the spread of disease; (3) address public safety concerns near roads; and (4) increase community support for re-established Wood Bison herds. Where hunting is allowed, it can lead to increased revenue for monitoring and management of the herds. (50 CFR Part 17). Sustainable levels of hunting of Wood Bison in Alaska will serve some of these same

purposes, including securing the support of project sponsors, e.g., ADFG, local communities, landowners, and nongovernmental organizations involved in the project (50 CFR Part 17). Reintroduction of Wood Bison to Alaska depends heavily on this support, including provisions for hunting as a future management option. Moreover, provisions for future regulated hunting will assure landowners and development interests that the reintroduction of Wood Bison will not interfere with natural resource development or other human activities. (50 CFR Part 17). Though it will probably take several years, the plan for the herd is to support both subsistence and sport hunts. A herd of 500 bison should be able to support a harvest of about 50 bison a year, based on a 20% annual growth rate (Mowry, 2005). One objective of the management plan is to ensure that harvest does not prevent growth and expansion of Wood Bison into adjacent areas where suitable habitat exists (AWBMPT, 2015).

Grazing/Agriculture: There is currently very minimal livestock grazing within the planned restoration area, so grazing is not a significant consideration. Interactions between Wood Bison and agricultural development can be prevented or minimized by managing herd size to maintain bison within the management area and away from agricultural development. Conflict could occur, however, between livestock grazing/agriculture and Wood Bison in the southeastern corner of the Minto Flats, where a few small agricultural operations exist. Such conflicts could be managed within the inherent flexibility found in the Federal rule for restoration (50 CFR Part 17). The measures envisioned by ADFG include removing bison that conflict with agricultural operations or using other actions to discourage bison use of agricultural lands (50 CFR Part 17). In the event some bison disperse to an agricultural area, it would be possible to remove the animals to prevent a pattern of use from developing (ADFG, 2013). Non harmful harassment of Wood Bison in coordination with ADFG will also be allowed in defense of property (AWBMPT, 2015). One objective identified in the management plan is to establish a cooperative effort between ADFG and local communities to develop procedures and train personnel to deal with problem bison.

Private and Public Land Use: There is resource development within the areas proposed for restoration, yet, the ADFG does not expect Wood Bison reintroductions to impede future human activities or other resource developments (50 CFR Part 17). The agency does not expect bison establishment to preclude or conflict with the development of oil, gas, or mineral resources. Nor do they expect any additional closures of roads, trails, or other recreational areas. There are no anticipated negative impacts to private landowner activities in the area (50 CFR Part 17). Wood Bison rarely attack people, and are less likely to do so than moose. The bison management plan allows for the lethal removal of bison in the defense of human life (AWBMPT, 2015).

Socio-Political Environment: In 2005, ADFG established the 'Wood Bison Restoration Advisory Group', a citizen's advisory group representing diverse stakeholders. The group reviewed the proposal to reintroduce Wood Bison, discussed the relevant issues, and provided recommendations to ADFG. The diverse group that often disagreed on topics ultimately reached consensus and recommended that ADFG move forward with Wood Bison restoration and pursue all three potential release sites (Mowry, 2005). The group

made this recommendation with the understanding that additional planning and public involvement would be needed prior to any bison release (ADFG, 2013). Once a site was chosen, a public planning process was initiated to develop and implement a management plan. Representatives from local communities, regional population centers, landowners, Alaska Native interests, wildlife conservation interests, industry, and state and federal agencies participated on the 'Alaska Wood Bison Management Planning Team' to develop the necessary management plan. The team agreed that all decisions should be by consensus. Following completion of the management plan, the team emphasized the necessity of meeting in the future to cooperatively find solutions to future challenges. The team recommended the management plan remain in place a minimum of five years to allow enough time for measuring success or failure (AWBMPT, 2015).

Landowner Incentives: The land around the Innoko/Yukon River release site is a 'checkerboard' of BLM and private Native corporation (private) lands. The Alaska Wood Bison Management Planning Team agreed that respecting private property rights is an important aspect of allowing reasonable, standardized land use for local and nonlocal residents as well as nonresidents. A land-use policy that provides a way for non-Native corporation shareholders to be able to access the Wood Bison resource was needed. In response to this need representatives of five Native corporation landowners developed a policy that allows for the collection of fees for allowing reasonable land use. The money generated from the land use fees would go into a private fund to be used for student scholarships (AWBMPT, 2015).

Reduced Risk of ESA Listing: The restoration of Wood Bison as planned in this Alaska program could eventually support a change in status for the species.

Funding: According to a preliminary cost-benefit analysis, the estimated cost for establishing a Wood Bison herd in Alaska is around $2 million over 25 years. The final price tag would be contingent on a number of factors, including how many animals are released, where they are released and the location of the source herd (Mowry, 2005). The state has committed $380,000 so far for releasing two groups of bison. One management plan objective is to ensure that revenue from drawing permits and application fees is used to support the management program (AWBMPT, 2015).

Due to budget shortages, ADFG recognizes it must find outside or private sources of funding to make the project viable (Mowry, 2005). Safari Club International, a hunting organization, has pledged financial support for the project; additionally the state is applying for grants from wildlife conservation agencies and groups (Mowry, 2014). The estimated benefits the state would derive from the restoration of Wood Bison is $12 million, according to the preliminary study (AWBMPT, 2015) and these benefits would come from hunting opportunities and associated economic activity, as well as activities associated with recreationists and others as a result of bison.

3.7 Alternatives Identified during Scoping but Not Considered in this EIS

The following suggested alternatives are outside the scope of this planning process and are not being considered as viable alternatives in this draft EIS:

Change How Yellowstone National Park Manages its Bison: The Interagency Bison Management Plan (IBMP) guides management of YNP bison and is being revised in a collaborative process separate from this statewide EIS.

Change How Bison are Handled When Migration Out of YNP Occurs: This alternative is not realistic within this process because the ways in which Montana and federal agency partners manage bison that migrate outside of YNP fall under the jurisdiction of the IBMP. Suggestions to dramatically change these management practices would require the development of a new IBMP. This is a process that is outside the sole jurisdiction of FWP and would require a large-scale effort involving numerous state, federal, and tribal management partners and processes.

Guide Tribal Management of Bison: This alternative is not realistic within this process because the manner in which different tribes *currently* manage bison on their sovereign reservations is outside the jurisdiction of FWP and the State. (There is typically no State involvement in the management practices or hunting programs that the tribes choose to implement because they are sovereign entities. Exceptions to allow joint management of hunting opportunities could be made through negotiated MOUs between FWP and tribal entities and would be necessary for implementation of Alternative #3 above (Section 3.2.3)

Send Bison to Other States: This EIS is being completed to evaluate bison conservation and management opportunities only within the State of Montana.

Restore Bison Across All of Montana: Current social, biological, and political constraints make restoring bison across their entire historic range in Montana unrealistic. Much of their historic range has been converted to other uses and there would be an unmanageable amount of conflict.

Confined Herd similar to the Moise Herd: Some confined herds are managed to emphasize herd productivity and often use supplemental feed. They also have round ups and sales, such as Custer State Park in South Dakota. Custer holds three sales per year to dispose of surplus bison and removes others through guided hunts (Boyd, 2003). There are other herds, which are smaller and used primarily for education and historical display such as the small herd of 11 bison at Hot Spring State Park in Wyoming (Boyd, 2003).

Other captive herds are used for conservation and tourism, such as the herd at the National Bison Range in Moise, which has a genetic management program as a major objective. The purpose of a captive herd determines many aspects of the management program. Management of a confined herd like that at Moise would not fulfill the desire by some for FWP to 'restore' a bison herd somewhere on the landscape nor would it likely meet FWP's

responsibility to manage bison as a valuable native wildlife species. Many hold the perspective that a captive herd cannot be considered wildlife, but is instead semi-domestic. The USFWS does not view private commercial herds as contributing to species recovery overall and thus a captive herd may be viewed similarly and not reduce overall concern for the species. There could also be limited ecological impact as bison would not be able to utilize the landscape to meet their seasonal needs on the landscape.

One of the primary factors associated with the management of a confined herd is the potential cost. The 2011 USFWS National Bison Range operating budget was more than $2 million for wildlife management, site maintenance, visitor services, law enforcement, and personnel costs. Within Custer State Park bison are managed alongside other species so while there is not a separate bison management budget some costs are directly bison related and are estimated to be around $60,000 annually. The Raymond Ranch in Arizona has an annual operating budget of approximately $100,000.

There are many who are concerned with the idea of hunting within a fully confined setting such as at Moise. The Raymond Ranch in Arizona, for example used to drive bison into a smaller area for hunting, but the public felt this presented an unfair chase situation. There would be other risks to recreational users of any area selected for a confined herd as the necessary bison management would be intense and could result in more restrictive uses or even full closure of the area.

Chapter 4: Environmental Consequences

4.1 Methods used to Estimate Potential Environmental Consequences

Since this is a programmatic review for a possible bison restoration project and no specific locations are under consideration at this time, this analysis is based on information and experiences from the bison restoration case studies in Utah, Alaska, Canada, and on private lands in Montana, in addition to other relevant bison-related projects and scientific research. The guidelines for any restoration effort, test project or otherwise, as described in Chapter 3 were also used to inform this analysis.

Two scales of restoration are considered here: 1) a release of 40 bison and a population goal to be determined; and 2) a release of 40 bison and a long term population goal of over 400 animals, which is the recommended herd size to retain 90% of genetic diversity.

The scale used for description of impact levels:

- **Negligible**—An adverse or beneficial effect would occur, but would be at the lowest levels of detection.
- **Minor**—The effect would be noticeable, but would be relatively small and would not affect the function or integrity of the resource.
- **Moderate**—The effect would be readily apparent and would influence the function or integrity of the resource.
- **Major**—The effect would be substantial and would result in severely adverse or exceptionally beneficial changes to the resource.

The analysis assumes an initial soft release of 40 animals to a property of at least 4,000 acres, i.e., 100 acres per animal. Any site with a final population goal of more than 40 animals would need to be much larger as restoration populations in other areas have grown anywhere from 9-22% annually (Brodie, 2008).

If an alternative(s) to restore bison at some level to a location in Montana is selected, a site-specific environmental assessment (EA) would be prepared by FWP to analyze potential impacts (direct, secondary and cumulative) to the location's existing resources as required under the Montana Environmental Policy Act. A site-specific management plan would also be developed as required by MCA 87-1-216 (5) if placement of restoration bison occurs on private or public lands.

4.2 Physical Resources

4.2.1 Ecosystem Contribution

Case Study Experiences:

Managers at case study sites in Utah and on the lands owned and leased by the American Prairie Reserve (APR) are monitoring the ecological impacts of their bison on existing vegetation and other resources. Presently, the Utah Department of Wildlife manages 325 bison on approximately 300,000 acres and APR manages 440 animals on 31,000 acres. No data on measureable changes to vegetation diversity, quality or quantity with the addition of bison on the landscape could be obtained for this EIS.

Large scale programs such as that initiated recently in Alaska and the Pink Mountain area of British Columbia manage for large herd sizes (>400 animals). These animals are allowed to roam within large geographic areas thus having the ability to select forage and habitat freely. This sort of 'free range' management can result in the greatest ecological impact to the restoration area as bison are allowed to move about freely selecting areas based on their biological needs and preferences.

Alternative #1: No Action

There would be no ecological contributions by restoration bison to additional lands within Montana if this alternative were selected. Bison-related ecological contributions would be restricted to lands where Yellowstone National Park bison migrate into Montana and where tribal and privately-owned bison are raised.

Secondary and Cumulative Impacts

No secondary or cumulative impacts can be predicted at this time for this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

As described in Chapter 2, bison are a keystone species within plains and prairie habitats by influencing localized vegetation and soil conditions with their wallows, sparring, and migrations. They also provide an important source of food for predators and carrion-eating wildlife.

If a chosen site has an acreage ratio of one bison per 100 acres for an initial release of 40 animals, FWP expects minimal negative ecological impacts to existing resources, yet, the site could expect some or all of the benefits previously described (see section 2.3) and as described below. However, actual impacts to ecological resources could vary depending upon the existing resources at a location, such as the type of vegetation, soil, and wildlife present. If a different acreage ratio is used then impacts may vary as well as. Long term ecological benefits could be moderate to major depending on the population goal for a given location.

Ecological benefits from the implementation of a bison restoration effort on private and/or public lands within Montana could include the establishment of new diverse micro-environments where bison graze or develop wallows. This increase in plant diversity is utilized by other animals and increases the diversity of wildlife within the region (Foresman, 2001; Picton, 2005; Gates et al., 2010). Knapp et al. (1999) found that grazing behavior of bison in conjunction with wallows and other ecological events, such as fire, provides suitable nesting habitat for a variety of obligate grassland nesting bird species such as upland sandpiper, grasshopper sparrow, mountain plover, McCown's longspur, ferruginous hawk, and long-billed curlew (Knopf 1996; Gates et al. 2010). Bison play a key role in ecosystem processes by contributing to the maintenance of grasslands and shrublands through rubbing trees and saplings, debarking and sometimes killing them (Knapp et al. 1999; Meagher 1973). It has been suggested that tree rubbing and debarking by bison may impede or even prevent forest invasion of open grasslands (Meagher 1973). Seasonal use of sites within the restoration location would likely create different impacts to different areas.

Furthermore, bison play an ecological role as an important food source for many predators and scavengers. Attacks on bison tend to be infrequent and opportunistic, with predators often selecting older or weakened members of the herd or young calves (Varley and Gunther, 2002; Wyman, 2002). Bison carcasses support wolves, grizzly and black bears, wolverines, bald eagles, ravens, coyotes, and swift foxes (Roe, 1970; Bogan, 1997; Truett et al., 2001). The presense of bison may facilitate predators in new areas as wintering bison or bison calves can be valuable food sources for predators.

There is some indication that grazing by both bison and elk can increase the productivity and stability of grassland systems and enhance the nutrient content of grazed plants (Frank and McNaughton 1992; Singer 1995). Bison may contribute to new plant growth by distributing seeds, breaking up soil surfaces with their hooves and wallows, and fertilizing by recycling nutrients through their waste products (USDI, 2000). However, trampled areas and wallows may also provide opportunities for invasion by nonnative and exotic vegetation and may contribute to soil and stream bank erosion (USDI, 2000).

If changes to vegetation or the presence of predators become a concern to the project landowner(s), FWP could implement mitigation tools that may include additional fencing to limit access to sensitive vegetation or promote movement away from an area and installation of predator deterrents similar to those used in the wolf management program.

Secondary and Cumulative Impacts

Depending upon the location chosen for this alternative, there may be secondary and cumulative ecological impacts, possibly beneficial and/or adverse, depending upon the past resource management activities by the landowner(s) and adjacent landowner(s), number of restoration bison relocated, and the site-specific bison management objectives.

Alternative #3: Restoration on Tribal Land

Potential ecosystem impacts could be similar to those described for Alternative #2. Some of the potential Montana reservation sites may allow for larger herd size, while others would have less capacity.

Depending upon the terms of the Memorandum of Understanding (MOU) approved by FWP and tribal representatives, which could include all the same requirements of a management plan with a private property owner, FWP would work with tribal partners on rangeland assessments as necessary. Additionally, FWP would also provide support to tribes in indentifying ways to mitigate bison-caused impacts to habitat such as reseeding, exclosures, fencing or population control.

Secondary and Cumulative Impacts

Depending upon the location chosen for this alternative, there may be secondary and cumulative ecological impacts, possibly beneficial and/or adverse, depending upon the past resource management activities by the tribal resource managers, number of restoration bison relocated, and the site-specific bison management objectives.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Potential ecosystem impacts could be similar to those described for Alternative #2. Under this scenario, the potential for a larger herd is greater thus it is possible ecosystem contribution and/or negative resource impacts could be greater than those for Alternatives #2 and #3 over the long term.

Secondary and Cumulative Impacts

Identical to Alternative #2, there may be secondary and cumulative ecological impacts, possibly beneficial and/or adverse, depending upon the location chosen and the past resource management activities by the landowner(s) and adjacent landowner(s), number of restoration bison relocated, and the site-specific bison management objectives.

4.2.2 Wildlife and Fisheries

Case Study Experiences:

No conflicts between bison and other native ungulates have been noted in the Book Cliffs area. No conflicts have been noted between bison and native ungulates in the Henry Mountains; however, UDWR actively discourages occupancy by elk in order to benefit bison and mule deer. Some conflict between the Pink Mountain herd bison and Stone sheep at high elevations during the winter have been noted. The analysis of the Wood Bison restoration effort in Alaska indicated no conflicts with other ungulates are expected in that area.

Preliminary findings on the APR fence design, as described within the APR case study (section 3.4.2), indicate unimpeded movement of elk, deer, and antelope. APR's mission is to create and manage a prairie-based reserve devoted to all wildlife, not just bison.

Alternative #1: No Action

With the implementation of this alternative, there would be no impacts to or changes for the management of wildlife within Montana by FWP. FWP would continue managing wildlife under the guidance of current statutes and policies. YNP bison would be managed under direction of the Interagency Bison Management Plan.

Secondary and Cumulative Impacts

A possible secondary effect of the selection of this alternative is listing of the American Bison as an imperiled species under the Endangered Species Act (ESA) of 1973, which could change how the species is managed in Montana by FWP. A listing could also change land use in areas designated as critical bison habitat under the ESA.

Currently there are only five Plains Bison conservation herds that have over 1,000 individuals. Seventy-four percent of Plains Bison conservation herds have populations of less than 400 individuals, with 32% having fewer than 50 (Boyd, 2003; Gates et al., 2010).

In 2009, a petition was submitted to the Department of the Interior (USDI) requesting the consideration of listing wild Plains Bison as a threatened species under the ESA. A 2011 lawsuit is still pending from the USFWS finding that a status review to evaluate listing bison as threatened is not warranted. In 2014, another petition was submitted to list the bison as endangered or threatened under the ESA. This petition was filed by the Western Watersheds Project and Buffalo Field Campaign. There has been no finding to date.

Based on three US Department of Interior initiatives related to the conservation and restoration of bison in North America, it is possible that the federal government could have an increased role in bison management in the future resulting in less of a voice for Montana citizens in bison management.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)
Bison evolved alongside other native ungulate species, such as elk, mule deer, and pronghorn. Due to the limited number of wild herds, interactions between restoration bison and other native ungulates have not been extensively studied; however, bison do co-exist with these species in multiple locations (Knowles, 2001; Barmore Jr., 2003), including the case study locations.

Based on the research referenced previously and below, and assuming a ratio of one bison per 100 acres there may be some minor competition between bison and other native ungulates. A different level of competition for forage may occur if the bison to acre ratio is different and existing vegetation conditions are uniquely good or bad.

Evaluation of any specific impact to native ungulates is based in part on the following biology of those species:

1. Bighorn sheep and bison diets are not significantly associated with each other (Singer et al. 1994). Furthermore, traditional bighorn sheep range in much of North America typically is located in terrain not associated with bison use (Reynolds et al. 2003).
2. Pronghorn antelope are highly selective feeders (Schwartz et al. 1977) whereas bison are more flexible in diet. The theory that large and small ruminants will not compete with each other for food resources (Bell 1971) is further affirmed by the similarity in sheep and pronghorn diets and dissimilarity to bison diets (Peden 1972).
3. Moose and bison habitats of the plains do not overlap (Reynolds et al. 2003). Moose forage on willows and other woody browse, particularly when preferred forage is of poor quality (Larter et al. 1994). Furthermore, because of the difference in height, moose are able to take advantage of taller browse than bison. In general, moose are primarily browsers and bison are primarily grazers and therefore are considered to be more complimentary than competitive in feeding habits (Reynolds et al. 2003).
4. Elk and bison have a low to moderate diet overlap, but a high habitat overlap. Singer et al. (1994) found that even at high ungulate densities in YNP, these two species did not measurably compete for diet components or habitat.
5. There appears to be little, if any, habitat or diet overlap between white-tailed deer and bison. Although bison and mule deer experience some degree of overlap in

habitat use, there appears to be little or no competition between these two species because of differing diet preferences (Singer et al. 1994). Competition may also be precluded by seasonal distribution differences and by the limited ability of deer to deal with deep snow (Barmore 1980).

Competition between bison and ungulates could be more considerable in certain habitats over others. Historically, bison group sizes tended to be smaller in mountainous or mixed terrain than in open prairie (McHugh, 1972; Berger and Cunningham, 1994a; Gates et al., 2010); therefore, a large herd in mountainous or mixed terrain could likely have a greater impact on native ungulates in competition of preferred forage. Elk are more concentrated in western Montana while pronghorn are more commonly found in eastern Montana. Mule deer and white-tailed deer are found across Montana.

This alternative would likely be implemented on a mix of landownership where fences may be abundant for livestock management. Any need to retrofit existing fences to manage movement of bison could positively or negatively impact ungulate movement depending upon the fence's design. See the discussion of fencing in section 2.4.2. FWP would work with landowner(s) to replace or install new fences that are a deterrent to bison movement but provide wildlife passage either below or above the wires. Any fencing associated with a bison restoration effort would be monitored and evaluated for its effectiveness to inform future adaptive management needs.

Some bison management activities, such as hazing or culling, may negatively impact resident or transient ungulates by the additional presence of humans and vehicles. Displacement of wildlife from a management area would likely be only for the duration of the activity and only affecting a limited number of acres.

Potential Impacts to other species

Beyond the six species of ungulates, there are 386 terrestrial wildlife species in Montana; some who evolved with the historic herds of bison moving within the Great Plains of the US. As identified by Ellison (2013), the variations in bison grazing pressure over thousands of years produced grassland endemic species to include 12 species of birds, 15 mammals and thousands of plants and insects. This report focused on the impacts of bison grazing to the populations of six sparrows (Savannah, grasshopper, vesper, Baird's, clay-colored, and song), western meadowlarks, horned larks, and chestnut-collared longspurs. Population densities for seven of the species increased with the presence and activities of bison.

Depending upon the grazing pressure of the restoration bison herd, there could be a minor positive benefit to bird and small mammal species at the site.

Similar to the potential issues acknowledged for ungulates related to fencing there could be no to minor impact to small mammals or birds depending upon fence designs.

Secondary and Cumulative Impacts

A possible secondary impact of this alternative is dependent upon the size of the restoration effort. A large herd restoration effort could be viewed by the USFWS as a

positive contribution to species conservation and could reduce the potential for the species to be added to list of ESA designated species in Montana. Federal bison restoration programs may deter a listing on their own. The National Parks Service's 2014 "Call to Action" document calls the NPS to restore and sustain three wild bison populations across the central and western United States in collaboration with tribes, private landowners, and other public land management agencies as part of celebrating the 2016 Centennial of the NPS. The federal agencies identified areas in Montana for potential bison programs.

Another secondary impact to wildlife could occur from the introduction of public bison hunting at a location where it was not previously permitted. The presence of humans and noise caused by hunting could increase stress on resident wildlife causing them to disperse to adjacent lands during bison hunting seasons, which could negatively impact crop producers. FWP could implement damage hunts as necessary if deer or elk linger on private crop lands.

Cumulative impacts are difficult to predict for this alternative since a location has not been selected and therefore past and existing wildlife uses are also unknown. Additionally, it is not known how long restoration bison would be at a location. There may not be any positive or negative affects to other wildlife species if the addition of bison is for a brief period of time only.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, competition for forage could occur at some level between bison and other native ungulates but is expected to be minor when the population of the bison herd is low and the ratio of one bison per 100 acres is used. However, competition could vary depending upon existing conditions at the site, historic uses of the land, if there is a different bison/acre ratio or if the population of restoration bison increases at a location.

Tribal management of lands and livestock where this alternative would be implemented could allow for fence removal or alteration in potential conflict areas where restoration bison are desired and ungulates are present. FWP would work cooperatively with tribal councils and resource managers to identify terms within MOUs that meet tribal and project goals.

Secondary and Cumulative Impacts

Identical to Alternative #2, there could be secondary and cumulative impacts to the site's wildlife depending upon the attributes of that location and if bison hunting was previously permitted. The placement of restoration bison on tribal lands could contribute to the conservation of the species thus reducing the likelihood USFWS would consider bison an imperiled species under ESA.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Similar to Alternative #2 and 3#, impacts to native ungulates may vary (minor to moderate) depending upon existing conditions, bison density, number of acres available to the bison, and bison management activities. FWP believes impacts related to competition

with other wildlife to still be minor based on current inter-species research and assuming the number of acres available to bison can be expanded as the population of the herd increases.

Identical to Alternative #2, any need to improve existing fences or install new fencing to manage movement of restoration bison could positively or negatively impact ungulate movement depending upon the fence's design. Additional bison management activities to reduce wildlife conflicts could include additional monitoring of bison behavior and use of the restoration area by other wildlife, and/or hazing of bison from areas used by sensitive species.

Secondary and Cumulative Impacts

Similar to the previous two alternatives, beneficial or adverse secondary impacts may occur depending upon the site's attributes. Any impact could be greater based on the larger herd goal of this alternative,

The size of the restoration herd could influence whether the species is considered by the USFWS as a positive contribution to conservation of the species. The large scale of this alternative with a long term population goal of more than 400 animals could be considered a positive cumulative contribution to species' conservation. An effort of this size could have a minor to major impact to ESA listing. A simulation model demonstrates that under ideal management conditions a bison population of 400 is likely to retain 90% of its current genetic diversity with a 90% probability for 200 years (Gross and Wang, 2005).

4.2.3 Vegetation and Habitat Management

Habitat management is defined as efforts to improve habitat conditions through appropriate actions such as water source developments, vegetative or mechanical treatments, prescribed fires, or reseeding if and when determined necessary by monitoring.

Case Study Experiences:

Studies in the Henry Mountains have found that high intensity summer bison grazing, while likely creating short-term reductions in forage availability, does not cause differences in plant community composition or potential productivity (Ware et.al. 2014). In the Book Cliffs area, the bison population levels on the state managed lands are such that impacts to date are small. However, the current bison population on the tribal lands portion may be beginning to have a negative impact and efforts are underway to reduce that population. Population objectives in the Alaska Wood Bison area are low enough that negative impacts on native range are not anticipated. There are some concerns in the Pink Mountain area that large concentrations of bison may impact the landscape. APR is actively monitoring their bison grazing and any impacts to rangelands. APR's bison stocking rates are less than earlier cattle stocking rates when the lands were under different management therefore any negative impacts are expected to be less.

In the Book Cliffs area, the State of Utah spends $400,000 per year on habitat projects for all wildlife, including the bison. The tribes spend another $100,000 depending on available funding. Over a million dollars has been spent on habitat and water improvement in the Henry Mountains restoration area to improve resources for both bison and domestic cattle. Much of this funding has been generated through regional hunting organization. The assessment of the Alaska Wood Buffalo program is that the currently available habitat can easily support the proposed population without much additional habitat management.

The type of habitat that a herd occupies can have an effect on group size as historically, groups tended to be smaller in mountainous or mixed terrain than in open prairie (McHugh, 1972; Berger and Cunningham, 1994a; Gates et al., 2010). Historical reports indicate that the 'mountain' bison of YNP congregated usually in bands of 5-30, rarely more (Meagher, 1973). The influence of restoration bison on any native landscape would thus vary dependent on where in Montana that site is.

Alternative #1: No Action

If the no action alternative were selected, habitat community diversity and compositions would remain unchanged and there would be no opportunity to learn how bison may use a new landscape in Montana. There would be no opportunity to assess different habitat management techniques. The lack of restoration bison could result in increased conifer or aspen encroachment into grasslands in some areas.

Secondary and Cumulative Impacts

No secondary or cumulative impacts are anticipated if no bison restoration project is initiated.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

The impact of bison on native landscapes is expected to be minimal so long as the population and distribution of animals is appropriate for the range. The initial release of 40 animals would likely result in minimal noticeable change to the landscape assuming the restoration occurred on a currently healthy native landscape. However, impacts to the diversity and density of existing vegetation may vary at a specific location and depend upon the condition of the lands prior to the bison's arrival. Additionally, weather conditions may also influence the level and frequency of impacts to vegetation.

Native prairie habitats in Montana are adapted to ungulate grazing and grazing can be important to rangeland health. The diet of the Plains Bison consists primarily of grasses, though bison will consume forbs and woody vegetation when their preferred vegetation is not readily available (Nowak and Paradiso, 1983; Foresman, 2001; Long, 2003; Burde and Feldhamer, 2005; Picton 2005). Grazers tend to be important for recycling nutrients in grassland plant communities. Since bison have the ability to move over large spaces and tend not to linger in specific locations for long periods of time, they allow plant communities to recover before being regrazed during the growing season.

YNP bison have been observed to graze more frequently in upland shrub and grassland habitats during the growing season. As the uplands mature late in the summer, YNP

biologists have observed the bison move in to wetland habitats to graze on the sedges that grow around the perimeter of wet pothole habitats and in oxbows that have been either cut off from stream flow or only carry water during the high flow period each summer (R.Wallen NPS, pers. comm. 2012). These sedge habitats provide important food resources for bison. While foraging in the riparian communities, bison browse on early growth portions of willow and cottonwood stems. Across Montana there is a variety of native habitat that bison historically used. Herds utilize smaller home ranges during the summer months and larger ranges during the winter. When in habitat of lower productivity, bison will increase the size of their home range.

Across Montana domestic livestock grazing programs occur on a variety of public lands that are managed by independent agencies. The land management agencies that allow for the most public grazing are the US Forest Service (USFS), Bureau of Land Management (BLM), and Department of Natural Resources and Conservation (DNRC). These agencies also manage for multiple uses, which includes use of the habitat by wildlife. Currently, Montana public lands support a number of wildlife species *and* domestic livestock grazing. Other regions that have bison restoration programs also have domestic livestock grazing permits, which indicates that public grazing permits can be maintained in the presence of bison.

As described in the previous section, Ecosystem Contribution (4.2.1), the grazing and wallowing behaviors of bison may result in the creation of specific micro environments, which contain plant communities that have a greater diversity than the surrounding region and can be beneficial to small mammals and some bird species. In addition, bison hair and fur can transport noxious weed seeds. Trager et al. (2004) found that annual species and exotic species were significantly more common in bison wallows than in grazing lawns and in annual burn sites. The intensity of wallow use has an effect on its vegetation with frequent visitation producing limited vegetation cover of primarily annual weeds (Collins & Uno, 1983). Trager et al. (2004) note that the exotic species they observed were most abundant at species-poor sites subjected to frequent disturbance. The amount of bare ground was significantly correlated with the percent of exotic species at the site level.

The potential for the spread of noxious weeds within restoration lands may be minor to moderate depending upon the level of noxious weeds at the location prior to the arrival of bison, density of vegetation cover, types of soils, and the number of bison at the location. FWP may work with landowner(s) in developing a site-specific weed management plan to define what control methods are to be used and responsibilities of involved parties. FWP has experience with weed management and various control methods on their state-owned properties.

Some sensitive plant species may be impacted by consumption or destruction by trampling, wallowing, or general bison movement within any restoration area. Yet, impacts to vegetation are anticipated to be generally beneficial for the maintenance of biological diversity in native plant communities.

FWP believes impacts to localized habitat resources could be minimal. Negative impacts could be mitigated by bison management activities, such as fencing or habitat management restoration activities. FWP would work with the landowner(s) and the local citizens working group to identify solutions for resolving issues. Beyond the potential for spread of noxious weeds, other concerns or issues may include additional sediment runoff to nearby water sources with the reduction of bank vegetation and/or damage to trees and shrubs.

Habitat management would have to be adaptive based on range capacity, growth of the bison herd, and the desired habitat conditions at the restoration site. Any habitat management activities would have to be agreed to prior to program implementation by FWP and landowner(s). Monitoring the restoration site for changes in vegetation or habitat use would provide FWP data needed to evaluate current management actions for effectiveness and information for any adaptive management adjustments for the restoration of bison in the future.

Any bison restoration program in Montana would have to consider current habitat and whether it could support the proposed species density at a specific location. Prior to the implementation of this alternative, FWP would have a forage analysis prepared by a 3rd party per the requirement of §MCA 87-1-216 (5)(e).

Secondary and Cumulative Impacts

Potential secondary and cumulative impacts to vegetation are difficult to anticipate at this time since a specific location has not been selected and its existing attributes are unknown. Possible secondary impacts may include changes in noxious weed densities near the boundary fences on adjacent lands and changes to noxious weed management on those lands.

Cumulative impacts are much more difficult to anticipate because in addition to not knowing an exact location, FWP does not know the past and present use of any site nor how those activities influenced the diversity and density of vegetation. Cumulative impacts may be negligible if the chosen area was maintained as open space and the restoration bison are at the location for a limited period of time; however, there could be beneficial impacts if the lands were used historically for a more intensive agricultural business or if the restoration bison are at the location for an extended period.

Alternative #3: Restoration on Tribal Land

Identical to Alternative #2, impacts may vary depending upon the existing habitat conditions at a restoration site, size of the area available to bison, and the population level of bison managed at the site. Methods to mitigate any negative impact could also be the same as described for Alternative #2. In this alternative, the involved tribal entity could be responsible for all necessary habitat management activities or they may be shared between any involved parties.

Secondary and Cumulative Impacts

Identical to the difficulty in predicting secondary and cumulative impacts for Alternative #2, such is the case if tribal lands were used for the placement of restoration bison. There are too many unknown variables to predict secondary or cumulative impacts at this time.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Anticipated impacts under this alternative may be less than for Alternative #2 and #3 when an initial group of 40 bison are release since the lands available to bison is to be ultimately greater in size than with the other two alternatives. However, moderate to major impacts to vegetation could be expected with a population of at least 400 bison that are allowed to move freely around the restoration area creating wallows and eating preferred species of vegetation. Seasonal use of the area would likely create different impacts to different areas.

Similar to Alternative #2, the need for habitat management and bison management activities would depend on the specific site and would be determined cooperatively with the landowner(s) and the local citizens working group.

Secondary and Cumulative Impacts

Identical to the difficulty in predicting secondary and cumulative impacts for Alternative #2, such is the case if this alternative is implemented. Additional to the unknown factors previously mentioned, there is the potential for the number of restoration bison to be much higher than considered for Alternatives #2 and #3. Potential secondary and cumulative impacts to vegetation could therefore be of a greater variety and greater intensity than for those alternatives.

4.2.4 Water Resources

Case Study Experiences:

Hunter groups in Utah have invested in water resource enhancements for both bison and cattle in the Henry Mountains (B. Bates, UDWR, pers. comm., 2014), which has minimized bison leaving the designated restoration area. In the Book Cliffs area there has been some concern over water resources particularly the lack of water in certain areas. Sportspersons and landowners have worked to address this by developing water sources for both livestock and bison. APR is currently studying the relationship between bison and water sources. Information to date indicates bison spend less time around those areas than domestic livestock (APR, pers. comm., 2014). In areas where natural water is extremely scarce it becomes a limiting factor for bison restoration.

Alternative #1: No Action

There would be no change to any existing water resources or need to change existing water resource management programs because a bison restoration program would not be initiated.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to Montana's water resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Since the specific water features of a potential restoration site are unknown, it is difficult to state how the placement of 40 bison would affect those resources. Potential issues could include increased sediment, increased erosion of banks, and reduction of bank vegetation. However, based on the documented research, FWP believes impacts to localized resources would be minimal. Any negative impacts could be mitigated with bison management activities, such as exclusion fencing or vegetation restoration. FWP would work with the landowner(s) and the local citizens working group to identify solutions for resolving issues.

Bison have been known to congregate in larger groups around permanent sources of water, but then separate to feed (Bamforth, 1987). A study of bison in Theodore Roosevelt National Park reported that bison did not center foraging activities near permanent water sources, but were instead highly mobile in order to utilize different water sources. Bison also used temporary water sources, went without water for at least one day, and utilized snow instead of water when available (Norland, 1984). Fuhlendorf et al. (2010) found that bison spend less time near water than cattle. Some bison managers believe the location and accessibility of water is essential to maintaining bison within fencing, as bison's motivation to breach the fence increases if more adequate resources are on the other side. Depending on existing water resources (natural and human-made) at the chosen restoration location, additional sources of water may or may not be necessary.

Secondary and Cumulative Impacts

There is the potential for positive or negative secondary impacts to water resources depending upon a variety of variables including the types and number of existing water sources, condition of bank vegetation, seasonality of water sources, and the number of restoration bison at the location. Since no location has been selected, it is difficult to predict secondary impacts but they may include improved localized water quality with a switch from cattle to bison, additional sediment downstream from the restoration location, or spread of noxious weed seeds downstream. Efforts would be taken to mitigate secondary impacts if they arise.

Cumulative impacts are also difficult to predict since an exact location for bison restoration has not been selected and FWP does not know what water resources may be present nor the condition of those resources at the time restoration bison would be released. Furthermore, FWP does not know what past or present landowner(s) actions may be contributing to the state of those water resources.

Alternative #3: Restoration on Tribal Land

Impacts to water resources on tribal lands may be identical to those described for Alternative #2 but could vary depending upon the existing types of water resources available to bison. Efforts to mitigate negative impacts to those resources could be mitigated by the same methods described for Alternative #2. FWP would work with tribal

leadership, tribal wildlife managers, and the citizens working group to identify solutions for resolving issues.

Secondary and Cumulative Impacts

Identical to Alternative #2, there could be positive or negative secondary impacts attributed to the placement of restoration bison on tribal lands for the reasons previously described but discussion of those possible impacts is difficult because a specific location has yet to be identified.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

With the availability of a large landscape, there may be the potential for numerous water resources within the project area. If so, bison would have a greater opportunity for movement between sources of water when seeking out grazing areas. FWP expects the impacts to an individual water resource to be minimal with greater movement between water sources.

If water resources are limited even within a larger restoration area, accessible resources would be more heavily utilized. As a herd's size increases, there is the potential for additional impacts to occur to water resources depending upon soil conditions, weather conditions, and the overall movements of the bison between water resources.

Identical to Alternatives #2 and #3, FWP would work with the landowner(s) and citizens working group to resolve and mitigate bison-caused negative impacts.

Secondary and Cumulative Impacts

There is the potential for positive or negative secondary impacts to water resources depending upon a variety of variables including the types and number of existing water sources, condition of bank vegetation, seasonality of water sources, and the number of restoration bison at the location. Since no location has been selected, it is difficult to predict secondary impacts but they may include improved localized water quality with a switch from cattle to bison, additional sediment downstream from the restoration location, or spread of noxious weed seeds downstream. Efforts would be taken to mitigate secondary impacts if they arise.

Cumulative impacts are also difficult to predict since an exact location for bison restoration has not been selected and FWP does not know what water resources may be present and the condition of those resources at the time restoration bison are placed. Furthermore, FWP does not know what past or present landowner(s) actions may be contributing to the state of those water resources.

4.2.5 Air and Soil

Case Study Experiences

None are known or documented.

Alternative #1: No Action
There would not be any impacts to existing air quality or soil resources since bison restoration would not be initiated.

Secondary and Cumulative Impacts
No secondary or cumulative impacts to Montana's ambient air quality and existing soil resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)
FWP predicts there would be negligible impacts to the existing air quality if a bison restoration program were established on public and/or private lands in cooperation with a willing landowner(s). Dust baths by bison in wallows would increase the particulates in the immediate area for the duration of the bison's activity.

Impacts to soils at a specific site may be minor to moderate depending upon the existing soil conditions, groundcover vegetation at that site, and the number of bison at a location. As previously described, bison will roll in sandy soils for dust baths; thus wallows are developed and localized disturbances to soils occur. Bison have the ability to remove localized vegetation, remove top soil, compact lower soil layers, and establish wallows in new locations that can be 15 feet wide and one foot deep. Wallowing is a behavior that creates disturbance to plant communities but provides adequate sites for re-colonization of early seral stages of plant communities adding to the diversity of the community. The soil within a wallow becomes exposed and compacted from use. This compacted shallow bowl collects rainwater and creates a microenvironment in which seeds can sprout. The seedlings of sedges and rushes occur in wallows that are otherwise absent in the prairie (Coppedge et al. 1999; Knapp et al. 1999; Lott 2002).

Methods to mitigate impacts to soils would be similar to those described for vegetation, which could include the installation of fences, hazing of bison away from sensitive areas, and reseeding of affected areas. FWP would work with landowner(s) to address concerns and to identify solutions in consultation with the citizens working group.

Secondary and Cumulative Impacts
No secondary or cumulative impacts to local air quality are anticipated if a herd of restoration bison are placed on private and/or public lands.

FWP predicts there would be no secondary impacts to soil conditions; however, there could be cumulative impacts depending upon previous land uses of the chosen site, vegetation coverage, soils types present, and the number of restoration bison utilizing the site. As an example, a large herd may contribute to localized negative effects to areas already denuded of vegetation and where sandy soils are present.

Alternative #3: Restoration on Tribal Land
Similar to Alternative #2, impacts to air quality are expected to be negligible and impacts to soils could vary (negligible to moderate) depending upon a number of variables at a given

location. Active bison management by FWP and tribal staff could mitigate many of the negative impacts.

Secondary and Cumulative Impacts

Identical to Alternative #2, no secondary or cumulative impacts to local air quality are anticipated if a herd of restoration bison are placed on tribal lands. Similar to the previous alternative, FWP predicts there would be no secondary impacts to soil conditions; however, there could be cumulative impacts depending upon a variety of variables and the existing conditions of the site.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Similar to Alternative #2, impacts to air quality are expected to be negligible and impacts to soils could vary depending upon a number of variables at a given location. If the herd's size reaches 400 animals, impacts to soils could be more numerous and possibly more detrimental even though the size of the restoration area is expected to be larger than the lands used for Alternatives #2 and #3. FWP would work with landowner(s) to address concerns and to identify solutions in consultation with the citizens working group.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to local air quality are anticipated if a herd of restoration bison are placed on large area of private and/or public lands.

Identical to Alternatives #2 and #3, FWP predicts there would be no secondary impacts to soil conditions but a larger herd of restoration bison, as anticipated under this alternative could add to existing negative conditions of exposed soils depending upon previous land uses of the chosen site, vegetation coverage, soil types present, and the number of bison.

4.4 Human Environment

4.4.1 Public Safety

Case Study Experiences:

None of the case studies have reported noticeable public safety issues. The bison programs in Utah have not had any reported incidents of bison threatening or injuring humans, even though the region of the Henry Mountains occupied by bison has seen a large increase in public recreational use. As a result of hunting, the Henry Mountains bison have become very wary of humans, with most tending to flee at the sound of a stopping vehicle or the smell of approaching hikers. Observations found that bison would often flee from an area after coming into contact with humans (Nelson, 1965).

In the Delta Basin of Alaska, there have been no reports of public safety concerns from restoration bison. There have been no reports of disease transmission from bison to humans in the case studies (see section 2.3.6 for a thorough discussion of reportable diseases found in bison.)

Other Experiences:

YNP annually reports bison encounters and related human injuries, which typically result from individuals attempting to approach, feed, pet, or be photographed with bison (Conrad and Balison, 1994; Olliff and Caslick, 2003). During 1980-1999, bison charged and made contact with humans 79 times, an average of 3.95 per year (the number of incidents each year ranged from 0 to 13) with every incident occurring in Yellowstone's developed areas or along roads. During that 20-year period, the average annual number of visitors to the Park was 2.7 million (NPS 2012). There were no injuries reported in 18 (23%) of the incidents (Olliff and Caslick, 2003) but nearly half of the injuries reported were sustained after a visitor approached a bison for a photograph or to view the bison more closely. The average distance between the bison and the human when the bison charged was 28.5 feet as estimated by reporting YNP rangers (Olliff and Caslick, 2003). YNP has taken extensive measures to educate its visitors on the importance of maintaining the proper distance from bison. In 2010 there were two reported bison incidents, one of which resulted in a non-life threatening injury. There were no reported incidents in 2011 (D.Wenk NPS, pers. comm. 2012). There are guide services that offer horseback trail rides to visitors throughout YNP but there were no reported incidents between bison and horses/trail rides during 2010 or 2011. More current data was not available from YNP for this EIS.

There have been incidents of the Jackson Hole, Wyoming bison herd moving into nearby neighborhoods and a golf course, but there have been no public safety incidents despite the large number of people in this area. The Wyoming Game and Fish Department haze bison from these areas when needed.

There have been no reported incidents involving human injury as a result of contact with bison in the Sturgeon River Plains Bison Herd, which moves between Prince Albert National Park and the surrounding region in Saskatchewan. There was one instance of a man being charged by a bull bison that he startled on a trail but he was not injured. Landowners in Saskatchewan have reported that bison tend to move off when humans enter an area, noting that it is possible to approach them more closely on horseback. A study of the behavioral response of the wild Sturgeon River Plains bison herd to human activity found that following the detection of human presence, bison reacted by fleeing the area (51% of 384 observations), looking in the direction of the human while remaining in place (46%), or approaching the human (3%) (Fortin and Andruskiw, 2003).

A study was completed during the summers of 2000 and 2001 on Antelope Island in Utah that examined the reaction of bison, mule deer, and pronghorn antelope to hikers and mountain bikers who were on designated trails. The study took place prior to implementation of a bison-hunting program and attempted to determine at what distance a bison would flee from a lone silent hiker or mountain biker. Of the 98 trail encounters with bison, the study found that 77% of the bison groups fled from the person, compared to 56% of pronghorn and 60% of mule deer (Taylor and Knight, 2003). The study found that on average bison became alert to the presence of the human when the person was 531 feet away, began to flee when the individual was 308 feet away, and tended to flee 82 feet from their original position (Taylor and Knight, 2003). The study found that a larger group size

tended to increase the flight response, as did the presence of calves (Taylor and Knight, 2003).

Alternative #1: No Action
There would be no new threats to human health or safety from bison if a bison restoration project was not initiated. Incidents of bison-human conflicts and bison-vehicle collisions would likely continue within YNP and in adjacent areas where YNP bison migrate to during the winter.

The risk of bison transmitting brucellosis to humans would continue to be low with the continued use of FWP guidelines for the handling of bison meat and the DSA cattle management zones in southwest Montana.

Secondary and Cumulative Impacts
No secondary or cumulative impacts to the publics' safety are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)
FWP predicts there may be only minor impacts to human safety from an initial release of 40 bison onto a designated restoration area since the acres would likely lack residences in its' interior, the private property would likely have been used to graze cattle, the public lands would likely have been managed as open space, the lands would likely have some form of boundary fences, and there would likely be limited interior public roads. The actual site attributes might vary from these descriptions, thus impacts may be less or considered moderate at a given location.

Many of Montana's wildlife pose some level of threat to humans through vehicle collisions or direct contact (bites, attacks, disease etc.). Public safety issues related to bison most often fall into three categories: vehicle collisions, personal injuries by direct contact, and spread of disease.

*Bison Vehicle Collisions***:** FWP acknowledges there could be a minor to moderate increased risk of bison-vehicle incidents since the location where restoration bison would likely be located would not have had bison previously and thus drivers in the area would lack experience with bison along roadways. The chosen site for the bison restoration project could be required to have fences or geographic deterrents along roadways to limit bison presence. (See section 2.4.6 for more information on bison-vehicle collisions.)

Personal Injury: FWP anticipates there would be a minor to major risk of personal injury to visitors near or within any restoration site since it has likely not had any presence of bison in recent times and humans may not behave appropriately. The potential for user conflicts with bison would be dependent on the number of restoration bison at the site, how large the property was, if the rut was ongoing, if bison calves were present, and the behavior of the visitors.

Efforts to minimize bison-human conflicts and incidents may include signage in the area of restoration describing bison behavior and best practices when in close proximity to them, educational outreach in local communities, increased monitoring on the locations and activities of bulls or bachelor groups, and monitoring of bison behavior on the landscape. FWP would work with landowner(s) and the citizens working group to identify potential conflicts and means of reducing those conflicts and issues.

FWP could also work with state and local road managers to post wildlife caution signs in pertinent locations to inform travelers of the possible presence of bison. Other measures such as fencing and hazing would be emphasized to reduce conflicts and limit the need for lethal control of problem animals.

Disease transmission: There would be no increased risk for the transmission of disease carried by bison to humans or other livestock because the bison used for this restoration effort would have to be certified free of reportable diseases by Montana's state veterinarian. The risk of transmission of common wildlife diseases would be no greater than the risk from other wild ungulates assuming standard meat handling recommendations were followed by successful bison hunters. Recommendations would be provided to hunters in pursuit of bison.

Secondary and Cumulative Impacts

Secondary impacts to public safety may include alterations to interior roads of the restoration area at the request of the landowner(s) to control vehicle traffic or usage of specific areas. There could also be an increased use of local emergency services when bison-vehicle incidents or bison-human conflicts occur. FWP could consider locating staff closer to the restoration site to provide improved monitoring of the restoration bison. Methods to mitigate these types of impacts could include increased efforts previously described for direct impacts, but different methods could be considered as well by FWP, landowner(s), and the citizen working group as necessary to address issues.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected, it is unknown what level of user activities would occur within the property, the bison/acre ratio, and the configuration of roads and associated traffic.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, there could be some minor or moderate increase in bison-human conflicts within or near the sites where restoration bison are located for the reasons previously described. FWP and tribal representatives could implement educational efforts and bison management programs to reduce risk of conflicts. Identical to Alternative #2, there would be no additional disease transmission risks associated with the implementation of this alternative.

Secondary and Cumulative Impacts

Secondary impacts of this alternative could be identical to those described for Alternative #2 depending upon the fencing, interior roads, visitor use of the restoration site, and other variables. Methods to mitigate these types of impacts could include increased efforts

previously described for direct impacts, but different methods could be considered by FWP, tribal resource managers, and the citizens working group as necessary.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected, it is unknown what level of user activities would occur within the property, the bison/acre ratio, and finally, the configuration of roads and associated traffic.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

There could be minimal to major risk of bison-human conflicts with a bison restoration effort to restore up to 400 animals depending upon the number of bison initially released, the site's geographic proximity to public roads, residences, and communities, use of the area by the public, and the distribution of bison within the restoration area. FWP and landowner(s), in consultation with the citizens working group, could implement public education programs or implement bison management activities to improve public safety.

As this is a large landscape alternative it is possible that bison could change their behavior and patterns of land use over time as they explore and learn new habitat areas. They would likely use areas based on forage productivity and potentially avoid humans when harassed or hunted, which would be consistent with the behavior of the bison herd at Sturgeon River and Antelope Island.

Secondary and Cumulative Impacts

Secondary and cumulative impacts are expected to be generally similar to those for Alternative #2. Unlike Alternative #2, secondary impacts may be less or greater in scale depending upon the number of bison and acres available to them. A larger area with a small herd might equate to minimal secondary impacts because bison could be dispersed across the property and rarely come in contact with humans.

Methods to mitigate these types of impacts could include increased efforts previously described for direct impacts, but different methods could be considered as well by FWP, landowner(s), and the citizens working group as necessary to address issues.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected. It is unknown what level of user activities would occur within the property, the bison/acre ratio, or the configuration of roads and associated traffic.

4.4.2 Property Damage

Case Study Experiences:

There have been no complaints of livestock fence damage from the bison in the Book Cliffs area. Fence damage that does occur is often attributed to elk in the area. In the Pink Mountain area bison have been fenced out of haystacks and away from buildings. Since, there are minimal agricultural lands in the Pink Mountains, Book Cliffs, and Wood Bison restoration areas; there have been no reports of property damage related to croplands.

Bison have reportedly gone through fences in the Henry Mountains area but since there are very limited agricultural lands in the Henry Mountains area, there have been no land-use conflicts. Conflicts have been mainly over the use of rangelands. APR's current containment program includes fencing on APR lands which has minimized access by their bison to neighbor's agriculture lands.

Other Relevant Experiences:
Reports from other existing bison restoration programs indicate that bison have an impact on fencing that is similar to other big game species. Bison have the potential to impact fencing particularly when being pursued by hunters or being hazed. There are occasions when bison break or damage fencing, but most managers report that bison tend to move along fences until they come to a break or an opening. Managers of captive bison programs note that containing bison within fencing is more difficult if bison have learned that there are desirable resources on the other side.

While there have been reports of bison horning, rubbing on, or damaging buildings or corals in the area of YNP it appears to be relatively minimal and typically fixed with fencing. Some Interagency Bison Management Plan annual reports have documented damage to landscaping (trees), fences, and lawn ornament by Yellowstone bison.

In the Delta Basin in Alaska, motorized vehicles can be used during bison hunts. This has led to some hunters using all terrain vehicles and snow machines in an illegal manner to pursue and herd bison while hunting. This activity commonly results in bison being chased through fences.

Alternative #1: No Action
There would be no new risk of damage to agricultural crops, structures, or fencing by bison within Montana. Threats to private property would continue in areas adjacent to YNP when bison migrate outside the park.

Secondary and Cumulative Impacts
No secondary or cumulative impacts to private property would be anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)
There would be minimal to moderate risk of property damage with an initial release of 40 animals depending on the design and condition of existing area fences, types of natural boundaries to deter bison movements, weather conditions, and proximity to residences, road, and communities. Environmental conditions could increase or decrease the potential for escapes to neighboring properties.

A containment strategy would be developed prior to the placement of restoration bison at any location which would meet the requirements of §87-1-216(5ci) MCA. The strategy would identify containment measures, removal strategies if bison escape to other properties, and an exit strategy if the project needs to be stopped and bison relocated. Per §MCA 87-1-216(7), FWP would be liable for all costs incurred, including costs arising from

protecting public safety, and any damage to private property that occurs as a result of FWP's failure to meet the requirements of containment (§87-1-216 (7) MCA) and/or when efforts to follow a management plan endorsed by the citizen working group have not been made.

In locations where drifting snows occurs in severe winters, boundary fencing may be knocked down or drifts may develop into ramps over fencing. In other locations, geographic containment features could fail to keep bison in the target area. In such instances, bison may migrate out of a designated restoration area resulting in property damage. Depending upon the issue or complaint, FWP may deter conflicts by installing additional fences near buildings, assist in the replacement of damaged fencing, or haze bison away from areas of concern. Additionally, FWP staff would respond to public safety and property owner concerns as is done for other wildlife species; potentially with the assistance of project partners. Educational outreach could be conducted to educate local residents or visitors to the area.

Secondary and Cumulative Impacts

It is difficult for FWP to predict secondary impacts to property damage since a site has not been selected and thus its attribute are unknown. However, secondary impacts of this alternative may include the need for adjacent property owners to install additional fencing to protect livestock, crops, or buildings from restoration bison that stray from their designated restoration location. Depending upon the restoration bison's visibility from a boundary road, wildlife viewers stopping along a highway or county road may create a traffic hazard to moving vehicles. This type of traffic hazard could be managed through signage prohibiting stopping on the road's edges and redirected to parking or safer viewing areas.

Cumulative impacts to property damage are impossible to predict since a specific location has yet to be selected, and thus, it is unknown what level of user activities would occur within the area, the bison/acre ratio, and finally, the configuration of roads and associated traffic.

Identical to the methods to mitigate direct impacts, FWP could include increased efforts to implement those methods, but different methods could be considered by FWP, landowner(s), and the citizens working group as necessary.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, there is the potential for minimal to moderate risk of property damage with an initial release of 40 animals at a location depending upon the existing attributes of the site and adjacent areas. FWP and its tribal partners would respond to public safety and property owner concerns as is done for other wildlife species. As an example, collaborative agreements for managing wildlife conflicts already exist between FWP and the Fort Peck Tribes. Additionally, conflicts may be mitigated by the methods described for Alternative #2.

Secondary and Cumulative Impacts

Secondary impacts of this alternative could be identical to those described for Alternative #2 depending upon the existing location's attributes, proximity to buildings and livestock, and other variables. Methods to mitigate these types of impacts could include increased efforts to implement those used for direct impacts, but different methods could be considered by FWP, tribal resource managers and leaders, and citizens working group as necessary to address issues.

Cumulative impacts to property damage are impossible to predict since a specific location has yet to be selected, it is unknown what level of user activities would occur within the area, the bison/acre ratio is unknown, and finally, the configuration of roads and associated traffic.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

FWP predicts there may be additional public safety challenges for FWP and partners with restoration at a larger scale. Potentially, there would be moderate to major risk of property damage with a herd of 400 bison depending upon the location's existing attributes and environmental conditions.

Steps to mitigate conflicts and concerns could be similar to those previously described for Alternatives #2 and #3.

Secondary and Cumulative Impacts

Similar to the secondary impacts for property damage described for Alternative #2, impacts may include the installation of additional fences by neighboring property owners to ensure any bison that stray from the restoration area do not comingle with cattle, damage crops, or damage buildings. Unlike Alternative #2, secondary impacts may be less or greater in scale depending upon the number of bison and acres available to them. As an example, a larger herd on a large landscape may translate into less risk of bison escaping from the designated restoration are because the available forage and water would meet their needs. Environment conditions could increase or decrease the potential for escapes to neighboring properties.

Methods to mitigate these types of impacts could include increased efforts previously described for direct impacts, but different methods would be considered by FWP, landowner(s), and the citizens working group as necessary to address issues.

Cumulative impacts to public safety are unknown at this time since a specific location has yet to be selected, and thus it is unknown what the site's attributes are, what level of user activities would occur within the area, the bison/acre ratio, and finally, the configuration of roads and associated traffic.

4.4.3 Livestock Resources

Case Study Experiences:

Restoration bison and cattle have coexisted within the same regions of the Henry Mountains in Utah since the 1940s. The cattle there are managed with a traditional fencing system, yet, the bison are able to move across the landscape. As the population of bison increased, so did tensions with regional landowners and livestock producers. Efforts to mitigate these issues included the creation of the Henry Mountains Bison Committee. Through the hard work of this committee, public support and tolerance of the wild herd appears to have increased. Efforts have been made to work through the remaining conflicts and maintain open communication between the regional stakeholders. The BLM, the Utah Division of Wildlife Resources, conservation organizations, regional livestock producers, and sporting groups have worked together to ensure that grazing continues to be shared by bison and cattle within the Henry Mountains. Over a million dollars has been spent on habitat and water improvement projects to improve resources for both bison and domestic cattle. Much of this funding has been generated through regional hunting organizations.

None of the programs with restored bison have reported observing bison attempting to breed cattle nor have they had any reports from regional livestock producers of bison trying to breed cattle. No hybrid offspring have been born. There are no reports of bison preventing cattle from using vegetation or water sources nor are there reports of bison goring cattle.

Other Relevant Experiences:

Ranchers have reported occasional observations of the wild Sturgeon River Plains bison herd in the presence of cattle, but they have not had incidents of bison harassing the cattle, and note that the two species appear to be pretty tolerant of each other. Bison do not breed with cattle in a natural environment.

Alternative #1: No Action

There would be no impact to livestock resources, positive or negative, from bison as wildlife on the landscape if a restoration project was not initiated. Wild bison could still be present in Montana as they migrate from YNP in winter and privately-owned bison would continue to be managed as domestic livestock. There would be no increased disease risk to livestock or other wildlife species. Yellowstone bison management would continue under the Interagency Bison Management Plan to include management based on a Designated Surveillance Area (DSA) for brucellosis transmission prevention. There would be no loss of grazing allotments or allotment availability to ensure there was a place on the landscape for bison managed as wildlife.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to Montana's livestock resources are anticipated with the selection of this alternative because no restoration bison would be located to new locations.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Landowners could consciously choose to replace cattle on range land with a release of 40 restoration bison on a designated restoration area. Direct impacts to the immediate area could be minimal because of the limited number released, required containment of the restoration bison, and the fact that any restoration bison would be certified as free of reportable diseases.

There could be the perception by some of the public that restoration bison pose a threat to Montana's cattle industry. Since the mid-1890s, livestock ranching has been an integral part of Montana's social character. Ranching and other agricultural activities continue to provide open range for wildlife. All 56 of Montana's counties have livestock operations. As reported in the 2012 Agricultural Statistical Bulletin, agricultural industries (crops and livestock) remain Montana's number one industry. Agriculture is valued at $3.8 billion with the inventory of cattle valued at $3.4 billion (National Agricultural Statistics Service, 2012). Value added to the U.S. economy by livestock production in Montana was $1.4 billion in 2011, of that amount $1.2 billion was contributed by meat animals (National Agricultural Statistics Service, 2012).

On bison restoration lands where cattle grazing would continue, comingling of the species could occur. Observations of interactions between cattle and bison have shown that they will sometimes graze within close proximity of one another (e.g. Van Vuren, 2001). However, bison and cattle often differ in the elevation and degree of slope in which they graze; with bison grazing on steeper slopes (Van Vuren, 2001). Cattle and bison display different foraging behaviors, with bison behaving more as energy maximizers (Nelson, 1965; Peden et al.,1974; Norland, 1984; Van Vuren, 2001; Fuhlendorf et al., 2010). Due to the differences in the behavior of bison and cattle the species are not ecologically functional equivalents (McMillan & Pfeiffer, 2011).

Bison could be fenced out of particular areas at the request of the landowner(s) which may have moderate to major costs likely to be the responsibility of the livestock producer. The effectiveness of fencing would be monitored and adjusted to ensure spatial separation of livestock and bison when deemed necessary. Separating bison from cattle to decrease comingling or disease transfer risk has worked very well in the DSA where bison seasonally migrate out of YNP. As restoration bison would be certified free of reportable disease the transmission risk of disease between restoration animals and domestic livestock is inherently minimal.

Livestock producers could incur additional costs to erect fencing specifically to keep bison that may have strayed from the restoration area off of their properties or to fix fences that bison may damage. Additional ranch staff time could be needed to haze bison off of private properties if bison were to stray.

Prior to the implementation of this alternative, FWP would have a forage analysis prepared by a 3rd party per the requirement of MCA 87-1-216 (5)(e) to determine if the proposed carrying capacity is appropriate for the designated restoration site.

FWP would conduct monitoring to track the restoration herd's size, behaviors and movements within the designated area, as well as the herd's health. Response protocols for disease outbreaks for any bison at a restoration site would be coordinated among FWP, the MDOL, and the state's veterinarian. Measures to comply with any applicable animal health protocol required under Title 81, 2(b) or by the state veterinarian would be detailed in a herd management plan (§87-1-216(5a) MCA).

Secondary and Cumulative Impacts

A secondary impact of restoration bison on federally or state-owned public lands may be conflict over grazing allotment use. Resource managers could consider changes to land use to accommodate the restoration of a native species and decrease user conflicts. This type of decision would be at the discretion of the federal or state agency.

Depending upon the perception of disease risk transmission from restoration bison to cattle, states receiving Montana cattle from non-DSA counties may require additional testing of cattle from counties where restoration bison are present. Livestock producers would incur any additional costs.

Predicting potential cumulative impacts to livestock interests is not possible at this time since there are too many unknown variables related to the actual site and how other states receiving Montana cattle may react to the presence of more bison in Montana.

Alternative #3: Restoration on Tribal Land

Similar to Alternative #2, any bison restoration program would involve some inherent but minor risk to livestock operations although FWP predicts they could be minor as; 1) the restoration bison would be certified free of reportable diseases by the state veterinarian, and 2) restoration bison movements would be restricted to a specific area. Some or all of the risk and liability could be assumed by involved tribal entities depending on negotiated management agreements.

Livestock stocking and grazing management decisions would be at the discretion of the tribe. Disease monitoring and response protocols for potential disease outbreaks would be coordinated by MDOL and the state veterinarian but followed by the tribal landowner.

Methods to mitigate bison-cattle conflicts could be similar to those used for Alternative #2 but could include additional options agreed upon by FWP and tribal representatives as identified in any MOU.

Secondary and Cumulative Impacts

Identical to a potential secondary impact for Alternative #2, perception of disease risk by other states receiving Montana cattle from non-DSA counties may require additional testing of cattle from counties where restoration bison are present. Livestock producers would incur any additional costs.

Predicting potential cumulative impacts to livestock interests is not possible at this time for the identical reasons stated for Alternatives #2 and #3.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

As with the previous alternatives, the initial release of 40 disease-free restoration bison at a location is unlikely to impact livestock resources. However, bison restoration at the scale of at least 400 animals could result in moderate risk to livestock operations. The risk of any negative impact to livestock however is supposed to be minimal within this alternative as the goal is to identify a restoration area with minimal current occupancy by livestock. The geographic area identified for this alternative could include only those areas where there are no current livestock operations or no active livestock grazing. Only willing landowners would be involved in implementation of this alternative as in Alternatives #2 and #3.

Identical to Alternative #2, FWP would have to meet all the requirements of MCA 87-1-216 with the development of a site-specific bison management plan prior to the implementation of this alternative.

Secondary and Cumulative Impacts

Identical to a potential secondary impact for Alternative #2, perception of disease risk by other states receiving Montana cattle from non-DSA counties may require additional testing of cattle from counties where restoration bison are present. Livestock producers would incur any additional costs.

Predicting potential cumulative impacts to livestock interests is not possible at this time since there are too many unknown variables related to the actual site, the livestock industry at large in Montana, and how other states receiving Montana cattle may react.

4.4.4 Cultural and Historic Resources

Case Study Experiences:

No discussion of physical cultural or historic resources are documented for the Book Cliffs tribal herd case study nor any of the other case studies. The social and spiritual connections between Native American people and bison are discussed in detail in 2.7.2, 'Tribal Cultural Values of Bison'.

Other Relevant Experiences:

In the area of the House Rock Arizona herd, there were concerns about potential impacts of bison on historic resources and cultural sites, particularly in Grand Canyon National Park where there had been human occupancy several thousand years ago. The structures built by these native peoples were built of rock and could be damaged by bison. There is currently no published data documenting damage to date.

The Iinnii Initiative of the Blackfoot Confederacy is an example of a large, landscape restoration effort to bring bison back to fill their ecological niche and the historic cultural role for native peoples. The goal of the Initiative is to restore bison which are central to the historical, cultural and ecological legacy of the region, conveying multiple benefits to the Blackfeet and providing native peoples the opportunity to reconnect with a living symbol of their ancient culture. The Iinnii Initiative also seeks to connect restoration efforts to the

economic sustainability of communities. These same themes of reconnecting Native Americans to bison can be found in the initiatives to restore bison by other Montana tribes.

Alternative #1: No Action

There would be no opportunity to increase the general public's connection with an iconic North American wildlife species or tribal cultural ties to bison with a no action alternative. Tribal entities could continue efforts to restore bison on tribal lands. No archeological sites could possibly be disturbed under this alternative.

Secondary and Cumulative Impacts

No secondary or cumulative impacts to existing historic or cultural resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Bison have the potential to negatively impact historic or archeological sites by horning, rubbing or otherwise damaging objects or structures. Bison would have the ability to establish wallows in new locations, remove localized vegetation, disturb top soil, and compact lower soil layers.

Since it is difficult to predict what cultural or historic resources may be present at a particular site, FWP can only acknowledge that negative impacts to cultural or historic resources could occur. A site-specific environmental assessment would be completed prior to the implementation of this alternative which could include consultation with Montana's State Historic Preservation Office or a federal heritage preservation officer as required by §22-3-433 MCA and the National Historic Preservation Act, respectively. Ways of mitigating impacts may include excavation of a site, primarily done for prehistoric sites, and/or installation of fencing around a historic site to deter any impacts bison may inadvertently cause.

Secondary and Cumulative Impacts

A possible secondary impact could be through bison movements and activities at a site which could result in the identification of new historic or cultural artifacts within a property's boundaries. If this should occur on federal lands, the resource manager would follow the agency's reporting requirements and the National Historic Preservation Act.

No cumulative impacts can be predicted at this time since a specific site has not be chosen and it is unknown if historic or cultural resources exist on site.

Alternative #3: Restoration on Tribal Land

Bison are an essential and highly valued element of the spiritual and religious customs and culture of many Native American cultures. Historically tribes depended on bison for numerous materials and as a main food source. More recently there have been efforts, such as the Iinnii Initiative, to reestablish the ecological and cultural ties between bison and native peoples.

Implementation of this alternative could inherently restore the cultural, spiritual, and historical connection between Native Americans and the bison. Restoration of bison onto any lands is anticipated to have a minor to major positive impact to tribes and those who support bison restoration. The cultural impact of restoring bison to tribal lands would likely be larger than restoring bison to other lands.

The Assiniboine and Sioux (Nakota, Lakota, and Dakota) tribes of the Fort Peck Reservation manage a cultural herd of approximately 183 bison that were transferred to the reservation from Yellowstone National Park following a quarantine process. This herd is managed on approximately 13,000 acres. (R. Magnan, Fort Peck Fish and Game Director, pers. comm.).

As of 2014, the Gros Ventre and Assiniboine tribes of the Fort Belknap Reservation established a cultural herd of 45 bison that were transferred to the reservation from Yellowstone National Park following a quarantine process.

Increased concern over the high rate of diabetes on reservations has led to a movement toward returning to a more traditional bison-based diet, thus many native tribes have restored domestic bison herds for meat production. There has also been momentum from many tribes for Montana or the federal government to restore wild bison in order to honor tribal treaty hunting rights.

Secondary and Cumulative Impacts

Any secondary or cumulative impacts to cultural or historic resource if restoration bison are placed on tribal are predicted to be positive because of the importance the species holds in native systems.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Impacts by restoration bison to historic and cultural resources on a large landscape would be identical to those described for Alternative #2, as would the possible methods used to prevent negative imoact to those resources. Also similar to Alternatives #2 and #3, restoration efforts could increase tribal connections between Native Americans and bison and those of the public who consider bison a romantic icon of the Old West.

Secondary and Cumulative Impacts

Secondary impacts could be identical to those described for Alternative #2.

No cumulative impacts can be predicted at this time since a specific site has not be chosen and it is unknown if historic or cultural resources exist.

4.4.5 Recreation and Hunting

Case Study Experiences:

Bison hunting opportunities are highly sought after in many places (see sections 2.4.3 and 2.7.3). Public harvest is allowed and used as a management tool in the Henry Mountains,

Book Cliffs, and Pink Mountain areas. Over 10,000 applications are submitted annually for 60-100 highly sought after once-in-a-lifetime permits in the Henry Mountains with an annual harvest of about 55 bison. About 200 bison are harvested in the Book Cliffs area annually with proceeds from hunting tag auctions going to tribal schools and scholarships. Up to 550 permits are issued annually in the Pink Mountain area. Public harvest can be used to control population growth, manage herd distribution, obtain biological samples for herd health monitoring, reduce public safety hazards or increase local support. The opportunity for public harvest has bolstered support by the hunting groups for bison restoration and in some cases habitat management projects such as those in the Henry Mountains area.

Public viewing is discussed in all of the case studies and is particularly important to the mission of the American Prairie Reserve.

Other Relevant Experiences:
Over 23,500 hunters applied for 138 Alaska hunting permits in 2013. Over 2,000 hunters applied for 25 Arizona permits in 2013. The 2014 Antelope Island hunt in Utah brought in more than 2,000 applications for less than 10 tags while the 2014 Wyoming hunt brought in over 3,000 applications for 336 tags. As of 2014, the Crow Tribal bison herd consisted of approximately 1,600 bison. Hunting tags are occasionally issued to the general public as a population management tool. (T. Jefferson, Crow Reservation, pers. comm.).

There has been licensed bison hunting in the areas north and west of YNP since 2005. Bison hunting season is from November 15 to February 15. Montana's bison license quota for the 2014-2015 hunting season was 80 either-sex licenses (20 in HD 385 and 20 in HD 395) with the potential for 200 additional second-choice state-issued licenses if conditions warrant. Of the 80 either sex licenses, 16 were allocated to Montana's Native American tribes in accordance with MCA 87-2-731. For the 2014-15 season, over 9,500 applicants put in for Montana's available bison hunting tags.

The Assiniboine and Sioux (Nakota, Lakota, and Dakota) tribes of the Fort Peck Reservation manage a tribal production herd that consists of approximately 121 bison (post hunting season), which are contained on approximately 9,000 acres (R. Magnan, Fort Peck Fish and Game Director, pers. comm.). There is a hunting program that is open to tribal and non-tribal members; approximately 50 tags were issued for the 2010 hunt. As of 2011, there were two additional private herds on the reservation. The first had approximately 100 head, and the second had around 50 head of bison.

As of 2014, the Gros Ventre and Assiniboine tribes of the Fort Belknap Reservation managed a herd approaching 618 bison in an enclosure that is approximately 22,000 acres. The tribes would be interested in expanding their herd if additional acreage was available. There are currently some limited hunting opportunities available to tribal members and the general public, mainly to cull older bulls.

As referenced in section 4.4.6, the presence of wild bison can be an incentive for people to visit a location. A report by Duffield et al. (2000) indicates about 50% of surveyed resident

and non-resident visitors to YNP indicated that seeing bison was a reason for their trip, and about 5% said they would not have come to the area if bison had not been present. In 2012, 40,000 visitors came to the federal and tribally managed National Bison Range Visitor Center near Moise, MT to see its bison and other wildlife species.

Alternative #1: No Action
There would be no changes to existing recreational activities on public or private lands nor any increased opportunity to hunt bison as wildlife in Montana. No new benefits or costs to wildlife viewers, hunters, or tribal entities would occur from restoration bison on the landscape.

Secondary and Cumulative Impacts
No secondary or cumulative impacts to recreational opportunities or resources are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)
The probability and extent of any increased visitation to a specific location by wildlife viewers, hunters, or recreationists is unknown with an initial release of 40 animals and unknown details of the restoration site such as size and accessibility. Project implementation at a site that has been historically closed to public access would in essence increase opportunity for hunters or wildlife enthusiasts as public access to restoration bison would be required. This could result in a moderate positive benefit to recreationalists. If the site has been historically open to the public, e.g., federal lands, then the addition of restoration bison would likely pose only a minor to moderate benefit to recreationists.

Outfitters could benefit from a minor increase in economic opportunity and FWP could benefit from the sale of additional bison hunting permits but only if the initial herd of 40 was allowed to grow to a size that could tolerate harvest. Many bison programs in other states use hunting as a tool to manage population size and distribution. Well managed hunting programs may have the potential to increase public support for and visibility of the species.

The addition of restoration bison at any location has the potential to impact outdoor experiences at a negligible to moderate level depending upon the circumstances of the situation. The two primary ways are physical inconveniences and physical endangerment. Physical inconveniences are considered to be situations where bison impede hunters, anglers or other recreationists progress on trails, along shorelines, or movements through campgrounds. Physical endangerment situations are described as when personal safety is threatened when bison are approached too close, when calves are present, during the rut, or if an animal is startled.

As referenced in section 4.4.1, one of the fundamental ways to decrease the potential for bison-human conflicts, especially those with the possibility for bodily harm is to maintain a large distance between people and bison. The research completed by Taylor et al. (2003) investigated the perceptions of hikers and mountain bikers to the responses of wildlife,

including bison, on Antelope Island in Utah. The results of their study showed that most recreationists felt that it was acceptable to approach wildlife at a much closer distance than was tolerated by the wildlife. On average, the real bison approach tolerance was approximately 103 yards versus the recreationist perception of 64 yards. The distance that bison tolerate humans can vary depending on the season, time of day, herd size, and presence of calves. In YNP, the average distance between the bison and the human when the bison charged was 28.5 feet as estimated by reporting YNP rangers (Olliff and Caslick, 2003).

Educational outreach efforts could be conducted in areas where restoration bison may be encountered to minimize bison-human conflicts. Hazing or lethal removal of problem bison could be conducted when needed. Actual mitigation methods for a location would be agreed upon by FWP, landowner(s), and the citizens working group.

Secondary and Cumulative Impacts

Secondary consequences of the implementation of this alternative are difficult to estimate since a site has not been selected and recreational opportunities for that site are unknown. Possible secondary impacts could include adjustments to big game hunting district quotas or hunting season adjustments if there are user conflicts between bison hunters and other hunters. Adjustments would require FWP Fish and Wildlife Commission approval. Other secondary impacts could include: 1) additional game damage hunts on adjacent lands if ungulates move from the restoration site other locations; 2) need for local emergency responders or FWP staff to go to the restoration location to address bison-human conflicts; 3) need for additional weed control because high visitor traffic is spreading seeds; and 4) need for establishing a dedicated parking area for visitor vehicles to decrease traffic hazards.

A secondary impact of this alternative could be increased hunting opportunity for tribal treaty hunters particularly during summer and fall seasons. Currently, some tribal hunters are not allowed to hunt in areas adjacent to YNP after February 1 due to tribal rule or out of respect to the bison, especially pregnant cows. Some tribes do hunt through the end of March, while others do not identify a limited season. Historically, tribes hunted bison during the summer months when the "buffalo had firm flesh, with plenty of fat, needed in the Indian's diet" (Whealdon et. al. 2001). During the summer bison's hair becomes very thin so the pelts can be dressed on both sides and made into a variety of articles such as clothing and teepee covers. Winter hides are thicker and show the stress of winter conditions. Any changes to the state's current bison hunting season outside of YNP would require FWP Fish and Wildlife Commission and MDOL approval.

Predicting cumulative impact is not possible at this time because there are too many unknown variables such as the size and geography of the site, historical and current public access, current recreational use, the number of restoration bison to be located at the site and the potential for the population to increase.

Alternative #3: Restoration on Tribal Land
Similar to Alternative #2 there could be a minor to moderate increase in bison hunting and/or viewing opportunities if restoration bison were placed on tribal lands. There could also be a minor increased threat to humans or interference with hunting or recreational opportunities similar to Alternative #2 depending upon the existing conditions at the site and the bison/acre ratio.

Hunting for tribal and non-tribal members would have to be allowed for this to be a true publicly owned herd. Any hunting program details would have to be agreed upon by FWP, tribal entities and the citizens working group. FWP and the tribe(s) would have to clarify if any financial incentives for allowing public access would be appropriate or desired.

Secondary and Cumulative Impacts
As with Alternative #2, secondary consequences of the implementation of this alternative are difficult to estimate since a site has not been selected and recreational opportunities for that site are unknown. However, secondary impacts could include those predicted for Alternative #2.

Predicting cumulative impact is not possible at this time because there are too many unknown variables such as the size and geography of the site, historical and current public access, current recreational use, the number of restoration bison to be located at the site and the potential for the bison population to increase.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock
There could be a moderate to major increase in bison hunting and/or viewing opportunities if the initial herd of 40 restoration bison was cultivated to a herd size of 400. Bison-human conflict could also be more common with this alternative as a large herd would occupy and move over a large area where they could encounter more people.

Methods to decrease or mitigate bison-visitor conflicts would be identical to those described for Alternative #2 and would also be developed by FWP, landowner(s), and the citizens working group.

Secondary and Cumulative Impacts
Identical to the difficulties with estimating secondary and cumulative impacts for the previous two alternatives, such is the case with this option. Possible secondary impacts could be the same as those described for Alternative #2 but more noticeable because of the size of the herd size called for in this alternative.

4.4.6 Local Economy and Social Values

Case Study Experiences:
APR manages a privately owned but publicly accessible bison herd. As of 2013, APR reports spending of over $24 million in the local community, including land purchases, equipment, supplies, payment to contractors, wages for local staff, real estate tax, and other reserve

management costs. APR pays real estate taxes on all of its deeded lands as well as taxes on personal property. APR is now one of the top tax payers in Phillips County.

See previous section's case study experiences for description of the different programs' current fencing experiences and agricultural impacts.

Alternative #1: No Action

There would be no restoration program under this alternative and thus no related change, i.e., positive or negative, in local employment or local economies that may have been attributed to the addition of bison on the local landscape. There would be no new benefit or cost to wildlife viewers, hunters, tribal entities, local governments, local emergency responders, livestock owners, or others.

Secondary and Cumulative Impacts

A possible secondary effect of the selection of this alternative may be the continued complaint of some of the public that the State of Montana and FWP are not doing enough to restore bison to the landscape. Some would thus continue to take steps to support the ESA listing of the species potentially forcing FWP into action to preserve wild bison.

No cumulative impacts are anticipated under this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

The presence of publicly owned bison in additional areas of Montana has the potential to bring increased tourism and hunting dollars to local economies. Public hunting would be a method for controlling the restoration herd's size and a community could experience a minor to moderate positive economic benefit with the management of restoration bison nearby. As an example, Table 4 represents a summary for hunter expenditures per day in FWP's Region 3 when hunters purchase food, fuel, lodging, guiding services, and supplies locally. Specific expenditures by bison hunters have yet to be researched and quantified.

Per day expenditures	Elk	Deer	Moose	Bighorn Sheep	Mountain Goat
Resident	$ 85	$ 66	$ 246	$ 288	$ 277
Non-resident	N/A	$ 232	N/A	$ 460	N/A

Table 4. Summary of hunter expenditures per day in FWP's Region 3.

Montana has hosted roughly 10 million non-residents visitors each year since 2005 (Grau, 2013). The combined 2011-2012 local expenditures from non-resident *and* resident travel within the state was $3.6 billion, which supports $2.9 billion of economic activity in the state and an additional $1.6 billion of economic activity, indirectly (Grau, 2013).

Regions around Yellowstone and Glacier National Parks receive large amounts of tourism revenue due to the millions of annual visitors to the national parks that also visit the surrounding states. About 50% of surveyed resident and non-resident visitors to YNP

indicated that seeing bison was a reason for their trip, and about 5% said they would not have come to the area if bison had not been present (Duffield et al. 2000a, 2000b).

The National Bison Range complex receives an average of 125,000 annual visitors (USFWS, 2014). Visitors come from all over the Nation and the world to visit, learn about, and enjoy a variety of wildlife on the complex that includes the National Bison Range property, Ninepipe National Wildlife Refuge, Pablo National Wildlife Refuge, and the Northwest Montana Wetland Management District. In 2012, approximately 203,500 resident and nonresident visitors viewed and photographed wildlife, hunted, fished, and participated in events and programs. Fifty thousand visitors came for wildlife photography opportunities and 40,000 visitors came specifically to the National Bison Range Visitor Center (USFWS, 2014). Bison restoration could be a way to increase tourism revenue in additional areas of the state assuming public viewing access was established and promoted as part of the restoration effort.

FWP utilizes hunting as a wildlife management tool, which in turn, generates public interest in the conservation of wildlife. Access would be required for public hunting in any restoration program. Any hunting program would have to be agreed upon by FWP, the landowner(s) and the citizens working group to include clarification of financial incentives (or not) for allowing public access. Bison have been hunted in Montana when they migrate out of YNP since 2005. During the 2014-15 bison hunt season, state licensed hunters harvested 40 bison and tribal treaty hunters harvested 142 bison. Bison hunting or the presence of restoration bison could negatively impact other hunting opportunities to include big game, upland game bird, and waterfowl hunting by increasing the number of hunters in a particular area or decreasing the comfort of some hunters pursuing game in areas where bison are present.

Outfitters in Montana offer clients a variety of recreational opportunities throughout the state including guided services for hunting, fishing, trail rides, mountain biking, and cross-country skiing. Outfitters are permitted on specific National Forests, hunting districts, or locations. Outfitters could be impacted by a potential restoration program, along with other outdoor recreationists. Bison presence on a landscape could offer additional opportunities for guiding hunters and wildlife viewers, but could also complicate activities historically pursued in an area if use regulations were altered due to bison presence.

Outfitters could benefit from a minor increase in economic opportunity and FWP could benefit from the sale of additional bison hunting permits but only if the initial herd of 40 was allowed to grow to a size that could tolerate harvest. Many bison programs in other states use hunting as a tool to manage population size and distribution.

Bison restoration near a city of any size could result in bison-human conflict and conflicting land uses, even in remote areas of Montana with low human populations where cattle ranches and crop production dominate the economy. Additionally, local emergency responders may be fiscally impacted if they are required to respond to bison-human conflicts or if restoration bison escape from their designated area.

Agricultural crop or livestock producers could incur additional costs to erect fencing specifically to keep bison that may have strayed from the restoration area off of their properties or to fix fences that bison have damaged (see sections 4.4.2 and 4.4.3). Additional ranch staff time could be needed to haze bison off of private properties if bison were to stray. In 2012, there were over 9.5 million acres of harvested cropland in Montana with nearly $2 million of those acres irrigated. The market value of grains, oilseeds, dry beans, and dry peas was $1.7 billion (National Agricultural Statistics Service, 2012).

Methods that could be used to decrease negative impacts from the presence of restoration bison may include increased financial support by partners to improve boundary fencing to restrict bison movements, reducing the size of the restoration herd to protect preferred forage for other wildlife species, or dedicating FWP staff to manage local user conflicts.

Social Values

The general public has strongly-held divergent values and opinions on public policy issues concerning bison management and potential bison restoration to additional locations within Montana.

Those who have championed the cause for reintroduction of bison to Montana's landscape would likely see implementation of this alternative as having a minor or moderate positive impact. However, those who oppose bison as wildlife in Montana, particularly in areas outside of the Yellowstone ecosystem would see implementation of this alternative as having major negative impact.

In 2011 on behalf of the Wildlife Conservation Society and the National Wildlife Federation, Moore Information conducted a survey of Montana resident's feelings about bison restoration. The telephone survey of 400 voters found that 70% supported restoring wild populations of bison on state and federal public lands, 24% were opposed to any restoration activities, and 6% were neither. Concerns of those opposed; 1) it would be impossible to keep bison off privately-owned land, 2) bison disease may damage Montana's cattle industry, 3) bison would compete with other wildlife and cattle for food, and 4) bison pose a threat to people and damage fences.

In 2015, Tulchin Research conducted a survey on behalf of Defenders of Wildlife to assess public attitudes toward bison and various public policy approaches to their management and restoration. The survey of 500 registered voters found that: 1) 81% hold bison in high regard versus 4% who hold unfavorable views of bison; 2) 68% view bison as wildlife versus livestock; and 3) 67% support efforts to relocate YNP bison to other parts of the state - 76% supported populations on public lands and 78% supported restoring wild bison to tribal lands.

Some social conflict around bison restoration could potentially be lessened if a willing private landowner(s) could be identified for program implementation to demonstrate bison restoration does not necessarily lead to negative impacts in private property rights. Yet, some public trust advocates worry that bison restoration to private lands could be akin to private ownership of public wildlife.

Bison restoration to federal lands would involve the voices of not only Montanans but citizens from across the nation and would require NEPA process. Many portions of federal land have private land in-holdings further complicating the acceptance of bison restoration on federal lands.

See section 2.7 for more on the recreational and social value of bison.

Secondary and Cumulative Impacts

If federal public lands are chosen for the implementation of this alternative, a secondary impact could be a change in current land uses in order to prevent recreational and grazing-related conflicts on public land grazing allotments. Communication and coordination between FWP, the landowner(s), and the citizens working group could identify methods to decrease these types of conflict.

Since a specific location has not been identified, it is very difficult for FWP to predict if there could be cumulative impact to a local economy or to social values. Many variables would need clarification before these types of impact could be described, such as the types of industries near the restoration area, the current economic vitality of the community, proximity to major traffic corridors, how many bison would be at the location, how long the bison would be present, etc.

Alternative #3: Restoration on Tribal Land

Tribal lands across Montana have different neighbors and thus different potential conflicts. Many of the land uses within and adjacent to reservations are similar in nature to include livestock grazing, agriculture, hunting, and recreation. The exact human uses of a particular area would depend on the specific restoration site selected.

Some of Montana's tribes have established bison-associated businesses, such as meat processing operations, in addition to maintaining commercial bison herds for fee hunting and cultural purposes. Depending upon the size of the restoration bison herd, need to control the herd's size, and terms of the MOU between the parties, there could be opportunities to support community programs with the addition of a nearby restoration bison project.

Social Values

Though widely absent from the plains, wild bison still hold an important place in the cultures and spiritual lives of many modern native tribes. In addition to the cultural and spiritual importance of bison there is also an initiative to improve tribal health by returning to the traditional diet of bison meat. Many tribes have established domestic bison herds for meat production *and* cultural purposes.

There have been moves from many tribes in Montana and the federal government to restore wild bison in order to honor tribal treaty hunting rights. Many tribes native to Montana and surrounding regions entered into treaties with the U.S. government that preserved their right to continue to hunt bison outside of their respective reservations.

In 2012, the Montana Wyoming Tribal Leaders Council passed a resolution that called for the state of Montana to recognize the trust responsibility and treaty obligation to American Indian Nations by providing for viable populations of migratory buffalo in their native habitat. The Council passed a second related resolution in March of 2013. This resolution continued to call for the state of Montana and Federal agencies to "recognize and honor its trust responsibility and treaty obligations to American Indian Nations in providing for viable populations of migratory buffalo in the wildlife species' native habitat."

A recent survey of residents within the Montana area of the Iinnii Initiative (Blackfeet Reservation) showed 74% of survey participants strongly agreed that bison are especially important to Blackfeet people and are an important symbol of Blackfeet history and culture. Seventy percent strongly supported the Blackfeet tribe partnering with neighboring federal, state or provincial land management to create more bison habitat. Fifty-seven percent strongly supported restoring bison populations somewhere in Blackfeet Country.

A number of polls or petitions have shown support for restoration of bison on tribal lands. One hundred fifty-five people signed a petition organized by a Hinsdale, MT resident in 2014 supporting full tribal ownership of quarantine bison by the Fort Peck and Fort Belknap Indian reservations.

Identical to the social values described for Alternative #2, there would be differing opinions, both positive and negative, on the topic of placement of restoration bison on tribal lands. Additionally, there are some who have expressed concern that tribal ownership of bison is a violation of public trust as traditionally non-tribal hunters have not had the same access to wildlife on tribal lands.

Secondary and Cumulative Impacts

Similar to the difficulties in predicting secondary and cumulative impacts for Alternative #2, such is the case for the possible implementation of a bison restoration project on tribal lands. There are too many unknown variables to predict secondary or cumulative impacts.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

This alternative has the potential for the restoration location to include private, public, and tribal lands to potentially accommodate 400 or more restoration bison. With that in mind, there is the potential for beneficial and adverse impacts to the local community or nearby communities similar to the examples mentioned for Alternatives #2 and #3. Because no location has been selected, specific effects are difficult to predict with any accuracy but some effects are likely.

Social Values

Those who have championed the cause for reintroduction of bison to Montana's landscape would likely see implementation of this alternative as having a major positive impact being that it calls for restoration of a genetically viable herd of 400 bison. However, those who oppose bison as wildlife in Montana, particularly in any areas outside of the Yellowstone

ecosystem would see implementation of this alternative as having major negative impact to the ranching culture of the state.

See the discussion of social values for Alternative #2 and section 2.7 for additional details.

Secondary and Cumulative Impacts

Similar to the difficulties in predicting secondary and cumulative impacts for Alternative #2, such is the case for the possible implementation of a bison restoration project on a larger landscape. There are too many unknown variables to make reasonable predictions.

4.4.7 Costs

Case Study Experiences

Reportable costs from the case studies vary greatly. In most cases, bison management activities are conducted in conjunction with other activities so specific costs for bison management only are not tracked. Survey and management costs for the Henry Mountains herd average $25,000 annually. Hunters in the Henry Mountains area invest $100,000 per year on wildlife enhancement projects. The American Prairie Reserve (APR) reports spending $50,000 or less annually to manage bison. Most activities and monitoring are conducted for multiple species and APR staff that manage and monitor bison have other duties. Start up costs to initiate the program on the Reserve were considerably more and annual costs to manage bison can increase in years with extreme weather conditions or research project costs (S. Gerrity, APR, pers. comm., 2015).

The track-able annual costs for bison management by the tribes in the Book Cliffs area is around $100,000 with specific habitat projects costing $80,000-100,000 each year. Much of the staff time for management, monitoring, and other activities of the Book Cliffs bison are included in the day to day general wildlife duties of UDWR staff.

The maintenance program costs in the Pink Mountain area are about $100,000 (CAD) annually with approximately $10,000 (CAD) directed specifically at bison habitat every 2-3 years. The inventory costs for a population assessment in 2014 were $40,000 (CAD). Estimated costs for establishing a Wood Bison herd in Alaska is around $2 million over 25 years dependent on a variety of factors including the number of bison to be released, where they are to be released, and where they will be translocated from (Mowry, 2005).

Other Relevant Experiences

The 2011 USFWS National Bison Range operating budget was approximately $2,100,000 for wildlife management, site maintenance, visitor services, law enforcement, and personnel costs. Within Custer State Park in South Dakota, 1,500 bison are managed alongside other species so while there is not a separate bison management budget some costs directly bison related are estimated to be around $60,000 annually. The Raymond Ranch in Arizona where 90 bison are maintained has an annual operating budget of approximately $100,000. The Canadian government has committed 6.4 million dollars over

a five year period to fund a bison restoration program of 600-1,000 bison in Banff National Park.

The Buffalo Expansion Feasibility Study from Oglala Sioux Parks and Recreation Authority in South Dakota identified four alternatives for their project given the landscape, its boundaries, and the desire to create a wild, free-roaming herd. The alternatives show required fencing estimates of $15,000/mile. They estimated cost of corrals large enough to handle the buffalo herd and meet National Park Service specifications to be $500,000. All their alternatives could be expected to employ at least one GS-5 through GS-7 Full Time Equivalent (FTE) at current rates of $31,000 to $39,000 (Licht, 2014).

In 2011, FWP's Interim Translocation of Quarantine Facility Bison EA estimated start-up costs for fencing, gates, handling facilities, equipment, water infrastructure, and storage shelters to be between $846,110 and $1,163,910 depending upon the translocation site and the existing facilities there. Below is a summary of costs from that EA that could be relevant to Alternatives #2, #3, and #4.

The following is not intended to represent a full economic analysis of any restoration project. Costs could vary greatly depending on site condition, existing facilities, existing personnel on site, and geography. Costs could be assumed by any partner of the restoration project to include MFWP, land management agency, private landowner or tribal entity. Assessment of fund availability would be included in any site-specific Environmental Analysis.								
	Unit Cost		Initial release of 40 animals		Herd size of at least 400 animals			
Fencing (assumes new fencing over ½ of the restoration area)	Low cost estimate ($3.00/ft)	½ of a 4,000 acre area (4,000 acres = 6.25 square miles)	$49,500 ($15,840/mile for 3.1 miles)	½ of the 40,000 acre area (40,000 acres = 62.5 square miles)	$495,000 ($15,840/mile for 31.5 miles)			
	High cost estimate ($8.00/ft)		$132,000 ($42,240/mile)		$1.32 million ($42,240/mile)			
Gates	$300/gate		$3,000		$30,000			
Water Infrastructure (improvement of existing water sources)			$5,000		$50,000			
Personnel for Herd Management (annual)			$50,000		$100,000			

Table 5. Preliminary cost estimates of a bison restoration program from the 2011 Interim Translocation of Bison Environmental Assessment.

Alternative #1: No Action

The bison restoration project would not be initiated, thus no new costs would be incurred by FWP. However, the future costs to continue the discussion of bison on Montana's landscape would likely continue to impact FWP. Costs of no action could include: 1) legal expenditures to fight accusations that FWP is not following its mandate to restore wildlife; 2) continued expenses to manage migrating YNP bison in the Gardiner Basin and near West Yellowstone; and 3) potentially being required to manage wild bison under the guidance of USFWS in response to an Endangered Species Act listing.

Secondary and Cumulative Impacts

A possible secondary cost of the No Action Alternative is a need to allocate staff time in the preparation of a bison conservation plan to be approved by USFWS if the species is listed under the ESA.

No cumulative costs are anticipated with the selection of this alternative.

Alternative #2: Restoration on the Private and/or Public Lands of Willing Landowner(s)

Based on the expenditures from other bison restoration programs in other states and Canada, costs for a Montana restoration program could range from $100,000 to over one million dollars depending upon the start-up and personnel costs required at a location. Implementation of this option would likely impact both the partner landowner(s) and FWP financially, but estimating costs is not possible at this time because there are too many unknown variables such as fencing requirements (new or improvements) and personnel necessary for oversight or monitoring. The availability of funding resources for a specific location is also unknown.

Annual costs are also difficult to predict since they are also site-specific. FWP regional staff may be required to allocate time to address bison-related concerns and incidents which may impact their abilities to compete usual duties. Local law enforcement staff and/or emergency responder staff could be impacted as well in responding to bison-related conflicts. Montana Department of Livestock staff could also be required to respond to concerned livestock owners within the area of bison restoration. Involved land management agencies could be required to commit additional staff time to monitor habitat conditions on the restoration site.

FWP anticipates some of the costs for the project would be shared between the FWP and landowner(s). Funding support would be sought from non-profit organizations, and federal and state agencies. Benefits or incentives through public/private funds or business opportunities could be offered but would have to be negotiated with partners, the citizens working group, and funders.

Additional revenue could be generated for FWP if hunting was used as a management tool to control the restoration herd's size. In 2014, sales of bison hunting applications and bison hunting licenses generated approximately $140,000 for the department. The revenue generated from the sale of additional bison hunting licenses could offset some of the costs associated with the management of a restoration bison herd. Any changes to FWP's bison hunting regulations and bison hunting quotas would need to be adjusted accordingly and approved by the FWP Fish and Wildlife Commission.

If this alternative were selected, FWP would be required to identify long term, stable funding sources for implementing all the provisions of the restoration bison management plan for meeting the requirements of MCA 87-1-216 (5). A budget would be developed by FWP and landowner(s) and would be included and evaluated within a site-specific EA. If FWP were to fail in meeting the requirements of MCA 87-1-216 (5), FWP would be liable for all costs arising from protecting public safety and damage to private property.

Secondary and Cumulative Impacts

Sustaining a long term restoration bison herd may have hidden costs to FWP, the landowner(s), and partner organizations that are unknown at this time. Both types of impacts are difficult to identify since this kind of project has not been attempted before by FWP.

Alternative #3: Restoration on Tribal Land

Identical to the potential costs and consequences of Alternative #2, a State and tribal partnership has numerous variables related to expenditures for a bison restoration project that make estimating costs impossible for this document. Multiple sources of funding, including tribal, would likely be required for project implementation and for annual costs.

Unlike Alternative #2, FWP is not required to meet the provisions of statute 87-1-216 (5) if restoration bison are transplanted to tribal lands. However, FWP would prepare a management plan to outline all management and funding responsibilities of involved parties.

Secondary and Cumulative Impacts

Without a particular site, there are too many unknowns to sufficiently predict what secondary or cumulative impact to FWP or tribal finances there may be.

Alternative #4: Restoration on a Large Landscape Where there are Minimal Conflicts with Livestock

Costs associated with the placement of restoration bison on a larger landscape than considered for Alternative #2 could be greater than described for that alternative because the need for fencing or watering improvements may be greater. Additionally, costs related to the active management of bison may be greater, especially if the herd's size is permitted to increase.

Secondary and Cumulative Impacts

Sustaining a long term restoration bison herd may have hidden costs to FWP, the landowner(s), and partner organizations that are unknown at this time. Both types of impacts are difficult to identify since this kind of project has not been attempted before by FWP.

4.5 Irreversible/Irretrievable Resource Commitments

FWP must consider whether the effects of the alternatives cannot be changed or are permanent; that is, the impacts are irreversible. FWP must also consider whether the impacts on the site's existing resources would mean that once gone, the resource could not be replaced, restored, or otherwise retrieved. These terms apply primarily to the effects of using nonrenewable resources, such as minerals or cultural resources, or to those factors such as soil productivity that are renewable only over long periods. It could also apply to the loss of an experience as an indirect effect of a "permanent" change in the nature or character of the land.

An irretrievable commitment of resources is defined as the loss of production, harvest, or use of natural resources. A useful example of an irretrievable commitment is found in the National Park Service's 2012/2013 Winter Use Supplemental EIS, "The amount of recreation activities foregone is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume production. An example of such a commitment would be the loss of cross-country skiing opportunities as a result of a decision to allocate an area to snowmobile use only. If the decision were reversed, skiing experiences, although lost in the interim, would be available again."

No irreversible resource commitments are predicted for any of the alternatives. Under the No Action Alternative, there would be no change to Montana's landscape or existing land uses because a bison restoration project would not be initiated. With the selection of one of the other alternatives, FWP still believes there would be no irreversible resource commitments since impacts could be mitigated and no nonrenewable resources are expected to be affected by the presence of restoration bison.

Pertaining to irretrievable resource commitments, there would be no commitments under the No Action Alternative since the project would not be initiated and there would be no changes to how the landowner(s) use their lands. However with the selection of one of the other alternatives, there is the potential for irretrievable commitments depending upon the current use of the lands where the restoration bison are placed. A possible situation could be described as the following: If restoration bison are placed on property (A) there could be a loss of cattle production at that location but cattle production could resume if the restoration bison were removed. It is difficult for FWP to predict what those resource commitments would be if the project were initiated because site-specific resources is unknown at this time.

Chapter 5: Miscellaneous

5.1 Preparers, Agencies, or Individuals Who Were Consulted or Contributed Towards the Preparation of the EIS and the Public Involvement Process

A number of organizations or agencies assisted in preparation of this EIS document or were contacted for information to include: Alaska Department of Fish and Game, American Prairie Reserve; Arizona Game and Fish Department; British Columbia Ministry of Forests, Lands and Natural Resource Operations; Bureau of Land Management; Charles M. Russell National Wildlife Refuge; Montana Department of Livestock; Montana Department of Transportation; National Park Service; Sturgeon River Plains Bison Stewards; Ute Indian Tribe Fish and Wildlife Department; United States Department of Interior; United States Forest Service; Utah Division of Wildlife Resources, Wildlife Conservation Society.

A number of organizations in addition to those above assisted in preparation of the document, *Background Information on Issues of Concern for Montana: Plains Bison Ecology, Management, and Conservation* that was used to inform much of Chapter 2 within this EIS. Those entities include the Buffalo Field Campaign, FaunaWest, Gallatin Wildlife Association, Greater Yellowstone Coalition; Montana State Historic Preservation Office; Montana State University; Nevada Department of Wildlife; Nez Perce Tribe; Umatilla Tribe; Western Transportation Institute.

As noted in the acknowledgements section, members of the 'Bison Discussion Group' provided assistance in the framing of this document. The following members participated in one or more of the three group meetings; Mark Albers, Keith Aune, Jay Bodner , Senator Taylor Brown, Ervin Carlson, Chelcie Cremer, Matt Derosier, Dick Dolan, Tom France, Andrea Jones, County Commissioner Chris King, Representative Mike Lang, Christian Mackay, Jeanne-Marie Souvigney, Dave McClure, Ron Moody, Vicki Olson, Senator Jim Peterson, Senator Mike Philips, Rick Potts, Tom Puchlerz, County Commissioner Lesley Robinson, Dean Rogge, FW Commissioner Richard Stuker, and FW Commissioner Wetsit. Discussions were facilitated by Virginia Tribe.

5.2 List of Acronyms

ADFG	Alaska Department of Fish and Game
APHIS	Animal and Plant Health Inspection Service
APR	American Prairie Reserve
BLM	Bureau of Land Management
BCWMU	Book Cliffs Wildlife Management Unit
BVD	Bovine viral diarrhea
BTB	Bovine tuberculosis
BSE	Bovine Spongiform Encephalopathy

List of Acronyms (continued)

CFR	Code of Federal Regulations
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CMR	Charles M. Russell National Wildlife Refuge
CSKT	Confederated Salish and Kootenai Tribes
DBWG	Delta Bison Working Group
DNRC	Department of Natural Resources and Conservation
DOI	Department of Interior
MDOL	Montana Department of Livestock
DSA	Designated Surveillance Area
EA	Environmental Assessment
EIS	Environmental Impact Statement
FLNRO	Forest Lands and Natural Resource Operations
FWP	Montana Fish, Wildlife and Parks
GYA	Greater Yellowstone Area
IBMP	Interagency Bison Management Plan
ITBC	InterTribal Buffalo Council
IUCN	International Union for the Conservation Nature
MACD	Montana Association of Counties
MACo	Montana Association of Counties
MCF	Malignant catarrhal fever
MCA	Montana Code Annotated
MEPA	Montana Environmental Protection Act
MNHP	Montana Natural Heritage Program
MT	Montana
NEP	Nonessential Experimental Population
NBR	National Bison Range
NPS	National Park Service
NWF	National Wildlife Federation
QFS	Quarantine Feasibility Study
SITLA	School and Institutional Trust Lands Administration
SNP	Single Nucleotide Polymorphism
SRPBS	Sturgeon River Plains Bison Stewards
UDWR	Utah Division of Wildlife Resources
USFWS	United States Fish and Wildlife Service
USFS	United State Forest Service
WY	Wyoming
YNP	Yellowstone National Park

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5.4 Appendices

5.4.1 Appendix A

Summary of the 2012 public scoping.